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THE COLOR COMPUTER MONTHLY MAGAZINE

November 1990 Vol. X No. 4

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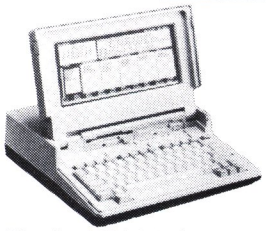

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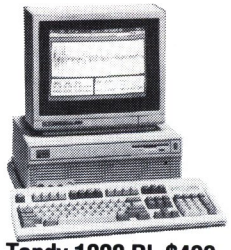

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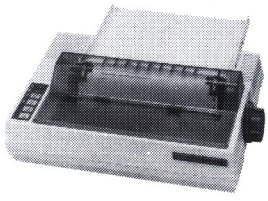

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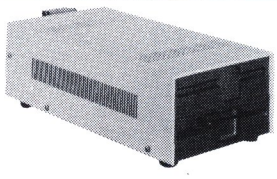

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10 years

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Letters to the RAINBOW

Companies on the Move

Editor:

We are happy to announce that on September 10, 1990, Microcom Software moved to its own commercial building — 7200 square feet! Conveniently located near the Rochester Institute of Technology and the University of Rochester, the building houses a store front, a large mail-order room and a service center. All operational computers are networked to better control order entry and inventory tracking. The larger facilities will allow Microcom to serve its customers faster and more efficiently. It will also help us cater to the needs of our Canadian customers, who drive to Rochester for CoCo products.

Manohar T. Santwani
President, Microcom Software

Editor:

Sundog Systems has changed addresses and we want to let your readers know about it. Our new address is given below.

Glen Dahlgren
Sundog Systems
8188 Peakwood Court, #5
Manassas, VA 22111

Likes BASIC09 Coverage

Editor:

In regard to the BASIC09 submissions to "Novices Niche" mentioned in "Wrapping the Rainbow" (August 1990), I like the idea and plan on making some submissions. I think this will encourage new OS-9 users, like myself, to keep working with, and learning, the BASIC09 programming language and OS-9 system.

James Ross
El Nido, California

Video Digitizer Quest

Editor:

I've wanted to purchase a video digitizer for my CoCo, but have been unable to locate a vendor. Colorware no longer sells one. Can you help?

Steven Moreno
1509 Lincoln Boulevard
Tracy, CA 95376

Colorware does sell the DS-69 digitizer, originally produced by Micro Works. Also, the Rascan-2 color digitizer is available from Supersoft. See their ads.

Looking for Root Hunters

Editor:

I enjoy your magazine very much and would like to receive information on a good genealogy program. I have some programs but they do not go far enough.

I am looking for a BASIC program that covers several generations, includes all vital statistics and that stores data on disk.

I am retired and have a 64K CoCo.

Paul T. Metcalf
27 Bell Drive
Salem, NH 03079

Prickly Pear at one time sold a genealogy program, but we're not sure if it is currently available. Try the pages of THE RAINBOW for "Right Back Where we Started From" (September and October 1987).

Multi-Device Blues

Editor:

I was surprised to see that Radio Shack no longer sells the Multi-Pak Interface. I would like to buy one on the used market or discover some other solution to the problem of simultaneously running my disk drive and modem.

Patrick Armstrong
348 Rapp Road
Talent, OR 97450

Consider the Slot-Pak, a multi-port device from Howard Medical.

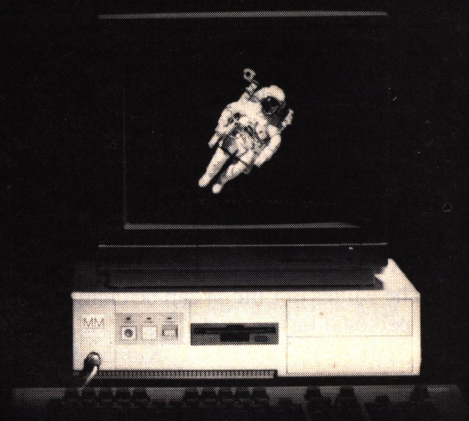
Colorful Modifications

Editor:

Two readers have written to ask how to get the full range of CoCo 3 HSCREEN2 colors into my program, JOYSTK3 (July 1990, Page 59). To do so, enter the following lines to get 15 colors plus the background (black), and to make some slight improvements to the program:

```
42 FORSL=8TO15: READPL:PALETTESL
,PL:NEXT
44 DATA 24,33,40,43,48,52,56,0
50 HSCREEN2:HCLS15
60 EXEC44539:IFPEEK(135)<48ORPEE
K(135)>57ANDPEEK(135)<65ORPEEK(1
35)>70THEN60
```

For the first time, a community has banded together to design their next computer -- a revolutionary computer, designed by you. The MM/1.



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```
250 DR=HPOINT (X,Y)
260 IFBUTTON(0)=1THENHSET (X,Y):
FORDL=1TO200:NEXT:HSET(X,Y,DR):G
OTO300
270 K=PEEK(135):IFK>47ANDK<58THE
NK=K-48ELSEIFK>64ANDK<71THENK=K-
55
310 POKE65496, 0: RGB:PRINT@224,
"ERROR #"ERNO"IN LINE #"ERLIN:EN
D
320 POKE65496, 0: RGB:CLS:END
```

Line 42 puts the palette values from Line 44 into slots 8 to 15. Slot 15, the background color, is black. For the CoCo 3 default colors green to orange, press 0 to 7. Press 8, 9 or A to F for colors 8 to 15.

The values in Line 44 can be changed to suit personal taste.

Keiran Kenny
Cremorne, NSW
Australia

Powerful Connections

Editor:

Is it possible to modify a CoCo 3 for use with the British 240-volt, 50-Hz power supply and 625-line, PAL TV standard using the RF modulator and transformer from a CoCo 2 sold in Britain? If so, how would I do this? Are there any companies that would make the modification for me?

P.R. Marlow
50 Lime Avenue
Bentley, Walsall
West Midlands, G.B. WS2 0JP

For information on using the CoCo overseas, refer to "CoCoing Abroad" (November 1987, Page 32) by Marty Goodman and Don Hutchison.

Reviewing Reviews

Editor:

I am writing this letter to hopefully dispell a misconception that Zebra Systems' *Label Designer* was somehow designed with a bug in it that won't allow it to print the full alphabet. Also consider this letter a testimonial to the power of your magazine's reviews, even many months after an issue appears. Your readers evidently keep their RAINBOWs on file or at least save reviews for products that might be of future interest.

In the May 1990 issue of THE RAINBOW, Ernest Zore gave *Label Designer* a very favorable review. One comment he made, however, has caused confusion and became the subject of letters and phone calls between your readers and Zebra Systems. The comment was, "For some odd reason, the alphabet only goes up to the letter V. Someone with a last name like mine could get offended by an omission like that."

People interested in *Label Designer* are writing and calling us to find out if we've gotten the bug out of our program yet because they think it won't print text for the full alphabet. *Label Designer* text fonts certainly do contain and print the full alphabet, digits and punctuation.

In addition to text fonts, *Label Designer* comes with picture collections. Most graphics labels use one or maybe two pictures and the pictures are usually large and prominent. It is often useful in printing tickets, diskette labels and other items that have one very large digit or letter for identification or as a sequence designation. Zebra does this in labeling its picture and font disks. So we dedicated one *Label Designer* picture collection to large graphics of the digits 0-9 and the 22 letters A thru V. For program structure reasons, all our picture collections hold 32 items, 4 less than the 10 digits plus 26 letters of the alphabet would require. We did not think it likely that the omission of the large letters W, X, Y and Z in one picture collection would matter to anyone. No user who has the program has ever brought this up as a problem.

Readers may not be familiar with all the work THE RAINBOW does to bring them accurate reviews. Before it was published, Zebra was sent a copy of Mr. Zore's review to check for technical accuracy. I personally checked the review and the only change I made was to correct our address. I realized there was some chance the comment about the letters W, X, Y and Z, though technically accurate, could cause confusion, but I didn't want to nit-pick so I let it go. That turned out to be my mistake.

I'd like to thank THE RAINBOW for continuing to do such a good job. THE RAINBOW is the most important entity for the continued prosperity of the CoCo product marketplace. Every CoCo enthusiast should subscribe to it and every CoCo product supplier should advertise in it. I'd also like to express my admiration of your readers for doing their homework to thoroughly research the products they buy.

Stewart Newfeld
President, Zebra Systems, Inc.
State College, Pennsylvania

Editor:

Regarding the October review of my test-writing program, WRITEST, I was out of town and unable make comments before publication. I have completely re-written the operating instructions. Also provided is a merge to put more-complete directions within the program until the user no longer needs them. Included is some dummy data with comments to be worked within the program. The program also will not scrap either itself or data without user approval. This was something I did not fully appreciate until I accidentally trashed an entire program with a single keystroke while using the school's Apple computer. WRITEST will take data and print a 15-item matching document (plus a key), in about 3/4 of the time it takes to get just the test out of my 1000EX, and it's a very fast and easy-to-use $8 word-processor. For tape users it is worth knowing that WRITEST can read old tape files and copy them to disk if you wish.

Darryl L. Petrak
CoCosoft
House, New Mexico

A Spelling Situation

Editor:

I have *Simply Better* (Version 2.0) which I run on a 128K CoCo 3 with a dual drive. I am looking for a spelling checker that will work with *Simply Better*. So far, I have only been able to find spelling checkers as part of a package (like *WordPower*). Obviously this is not for me as I do not want to change word processors. Although I seek a spell checker, I would be more than happy to find one that also checked punctuation, dual words, etc.

I have searched through THE RAINBOW and, except for the above, have come up dry. Can anyone tell me where such a utility might be purchased?

Edwin A. Tincknell
254 Maple Road
Longmeadow, MA 01106

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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Powerful OS9 word processor with multi-tasking, pull down menus & more. Only **$59.**

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Excellent hands-on guide to OS9 Level II for beginners. Req. 512K, 2 drives & Monitor. Book/Disk **$32.99**

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Vol 1: 15 Power-packed utilities such as sort, lost-file location, disk pack & more. **$24.95**

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In-memory disk drive! A must for every OS9 user. Req 512K. Disk Only **$29.95**

From Burke & Burke

RSB v1.3: The revolutionary program that allows you to use Basic from under OS9 Level II. **$39.95**

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EZGen Version 1.6: Powerful OS9 Bootfile editor. Change names, add/delete modules, patch bytes, etc. Only **$19.95**

From Alpha Software

OS9 Level II BBS: Best BBS for OS9. Comes with terminal program. Req. 512K & RS232 Pack. Only **$29.95**

Level II Tools: 25 Utilities such as windowing, wildcards, tree, etc. **$29.95**

Disk Manager Tree: Change, copy, view, create directories with ease. Req. 512K. **$29.95**

Warp One: Level II Windowing Terminal. Req. 512K & RS232 Pack. **$34.95**

Zapper: Patch disk errors. $19.95 Multi-menu: Create own pop-down windows. Req. 512K & Multivue. **$19.95**

Presto Partner: Notepad, calculator, calendar, phonebook, clock at your fingertips. Req. 512K. **$29.95**

Transfer Utilities

GSC File Transfer: Transfer files from MSDOS,OS9, RSDOS, and FLEX. Req. OS9 (Level II for Multivue Ver), 2 drives, SDISK/SDISK3. Standard Version: **$44.95**; Multivue Version: **$54.95**

PC-Xfer Utilities: Format/ transfer files to/from MSDOS to CoCo under Level 1/2. Req SDISK/SDISK 3. Only **$44.95**

SDISK3: Standard drive replacement module allows use of 40/80 DS/DD drives. Requires OS9 Level II. $29.95

SDISK: $29.95

From R3 Systems

Screen Control Utility: Gain control of text screen. Only **$19.95**

Menuing Utility: Memory resident menuing system. Only **$19.95**

Point-and-Shoot File Selection: $19.95

From Frank Hogg...

Dynastar: Popular OS9 word processor. Only **$99.95**

Dynastar + Dynaspell: $119

Wiz: Terminal Prog. **$59.95**

Sugar Software

OS9 Calligrapher: $24.95
Font Massager: $19.95

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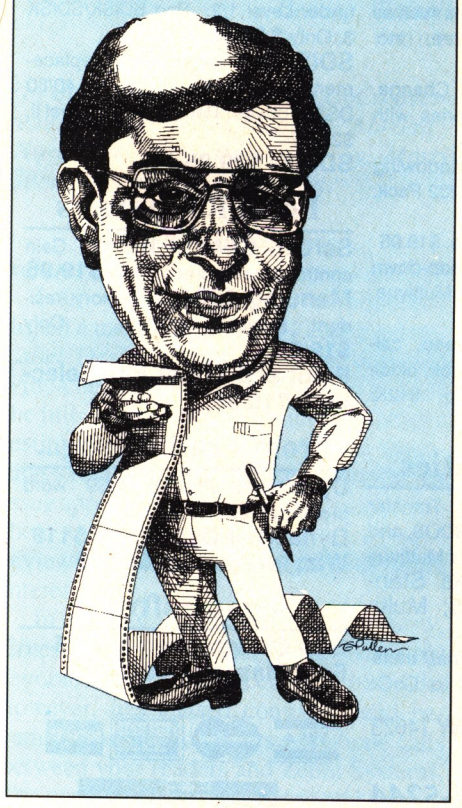
World Net



I have recently completed reading David Brin's *Earth*, a very interesting novel about the world of the near future. I think it has some insights for us all. Although it is a good one, forget that *Earth* is essentially an environmental novel, and forget too that it deals with the highly improbable ability of humans to manufacture black holes. I simply do not have the physics background to determine whether this is plausible — this is just a novel anyway.

What is striking about the book is Brin's prediction that within 50 years our world will be embraced by an all-encompassing data-communications network very much along the lines of Delphi or CompuServe. I don't know what they are planning in Boston or Columbus, but it is probably nothing close to Brin's suggestion. The idea makes captivating fare nevertheless.

Earth does the hard job of predicting the near future which I think is more difficult than predicting the far future, since people will be around to see it and have definite ideas about what will happen. The concept is an exceptional one and author Brin has obviously been doing some "running around" in data services. His thoughts make a fine backdrop for this data communications issue of THE RAINBOW.

Brin predicts a "world net" in which virtually all means of communication are combined into a single entity — fax, mail, news. Most intriguing is that almost anyone can set up priorities for different items. This means that since all kinds of information are filtered into the net, you can obtain custom information based on your interests every day.

I have often wished I could do this on Delphi, downloading daily UPI stories of world and national news in addition to sports — all done overnight.

Earth's world net goes much further than this, of course. World net acts as a repository for information of all kinds — sort of an instant *World Almanac*. If, for example, you are interested in literacy levels, any new report from any government would be sent to your queue.

While all of this is fascinating, another aspect of Brin's world net is even more absorbing — users groups of most every kind and description. These are, of course, patterned after the users groups on a service like Delphi. But as he foresees it, virtually every kind of political, religious, social or anti-social group will have its own space. Such groups also have the ability to "broadcast" to the world net at large.

Although this aspect of the novel captured my imagination, it is not the central theme of the book. The environment is. However, the characters would have a difficult time functioning without the world net and this is certainly an impressive prediction of things to come.

Of course with our CoCos, we have a net of our own available on Delphi. Although these are computer forums (incidentally, our company also runs Delphi forums for teens and aviation, as well as computers), the messages and conferences often veer into other areas. Seeing how this happens, and how riveting it can be to participate, makes me think Brin's projections may not be far off base in this regard.

For what it is worth, these are the 90s. We think of the 90s of a century ago as quaint, with handlebar moustaches, barbershop quartets and couples walking at arm's length in "the gloaming." Will our children, hooked to the world net Brin foresees, think of our little computers, Postal Service and the like as similarly quaint anachronisms of a "kinder, gentler" era?

Let's meet on Delphi and discuss it.

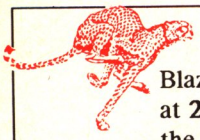
— Lonnie Falk

...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor..." **Word Proc. Comparison**-April 1989 Rainbow; Pg 26.

Word Power 3.3

The Best Just Got Better!

"...friendly...amazing execution speed...much easier to use than VIP software & 2 other systems I've tried...very user friendly...highest among word-processors"-Rainbow Oct 88 Rev.



SPEED

Blazing Fast! Runs at **2 Mhz** and uses the standard text screens for lightning fast execu-

MEMORY

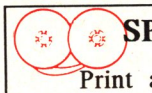
Word Power 3.3 allows **72K** of workspace on a 128K CoCo and **460K** on a 512K CoCo. More memory than any other word processor. Period.

DISPLAY

Choice of **40** or **80** columns with your choice of colors. Can be used with RGB/ Composite/Mono-chrome Monitors and TV. Pull down menus, plain english prompts, on-screen underlining and page break display make

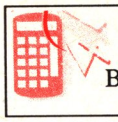
EDITING

Powerful full-screen editor w/ word-wrap. 4-way cursor,scrol-ling; Line Positioning; Block Commands; Search, Replace; OOPs recall during delete, adjustable key-repeat, key-click, typeahead, Tabs, Word-Count and much more! . Built-in extensive **HELP** screen can be accessed anytime during edit.



SPOOLER

Print and Edit docu-ments at the same

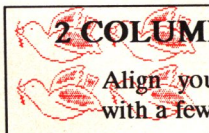


CALCULATOR

Built-in 4 function calculator!

SORTING

Sort lists in a flash!



2 COLUMN PRINTING

Align your text in 2 columns with a few keystrokes!

GRAPHICS

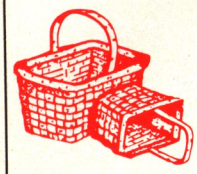
Insert **graphics** in your documents! Allows you to im-port PMODE 3/4, HSCREEN and CoCo Max

SPLIT-SCREEN EDITING

Freeze a portion of text and edit another. Its fantastic!

MAIL MERGE

Type a letter, follow it with a list of names & addresses and have Word Power print out personal-ized letters. Its that easy!

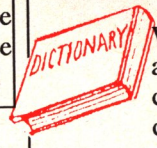


SAVING / LOADING

Creates ASCII files that are compatible with other word-processors, terminal programs, etc. Allows directory point & select for easy loading/saving, **Automatic Backup**, file erase, free space display. **ARE YOU SURE?** prompts prevent accidental deletes. The **Auto-Save** feature automatically saves text to disk during user-defined intervals for peace of mind. Supports double-sided drives.

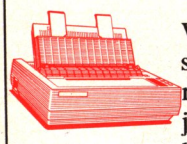
MACROS

Playback up to 250 keystrokes with a sin-gle key! Automate multiple tasks with a single key! You'll love it!



SPELLING CHECKER

Word Power 3.3 include a **80,000** word spelling checker which finds and corrects mistakes in your text.

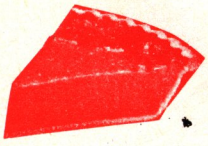


PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks,

PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, dou-ble-words, a/an usage, spaces and more. Its the perfect addition to any word-proccessor.



DOCUMENTATION

Word Power 3.3 comes with a well-written instruction manual & reference card which makes writing with Word Power as easy as pie. Word Power 3.3 comes on an unprotected disk.

Only

$79.95

Upgrade Policy: Word Power 3.2 owners can get Word Power 3.3 by sending original Word Power disk and $15 to the address listed below.

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UPS 2ND DAY AIR

Stevedores!

When the longshoreman's call beckons, try your hand . . .

by Grant Bloedow

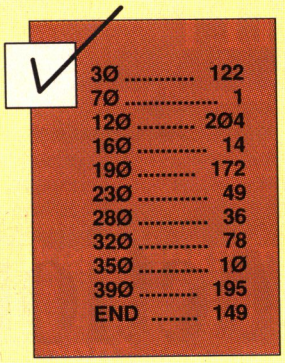
Stevedores is a BASIC version of a popular Russian game but disguised in a new scenario. The object of the game sounds relatively simple. You are a stevedore and your job is to load the cargo ship.

To load the cargo hold of the ship, stack the box configurations as efficiently as possible. Use the left and right arrow keys to move the boxes to the position where you would like them dropped. You can also rotate the box configuration 90 degrees by using the up or down arrow keys. When you are ready to drop the piece, press the space bar. The boxes will fall until they hit the top of another box or reach the bottom of the cargo hold. The game is over when the cargo hold is filled and the boxes reach to the top of the hold past the white full line. The ship will then leave for its destination port. Be careful not to drop boxes on the ship's deck. This will also end the game.

This is fine, except wasting time will cost the company money. If you select the pvactice mode you have an unlimited amount of time. But when playing with time you are scored by how fast you can drop each box. If you take the full time the boxes automatically release and drop even if you aren't ready. This can fill the cargo hold quite fast. When beginning with time you are allowed five seconds to orient the piece before it falls. After each set of 20 box configurations, a whistle starts the next level giving you one-half of a second less time. Upon filling a row of the hold it slides further into storage and the rest of the stack falls to accommodate the new space. This is critical to achieving a high score.

Here are some hints for playing *Stevedores*: The next piece to be loaded is shown below the stevedores compartment. As a piece falls, look at the next piece to plan where it should be dropped. This will save you some time. If you missed filling a box place and have already covered it with other boxes, it can be uncovered by filling the rows above it to let the upper rows fall down to uncover the hole. Good luck, stevedore, and happy loading! ❑

Grant Bloedow is a freshman at St. Olaf College. He enjoys tennis, art and computing. He may be contacted at 4400 Cedar Lake Rd. #1, St. Louis Park, MN 55416, (612) 374-4483.



The Listing: STEVEDOR

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 DATA11,11,5,11,17,11,5,17,17,
11,17,11,17,11,11,11,11,5,11,17,
17,5,11,17,11,17,11,17,12,6,,12,
,,12,12,6,18,,,6,12,6,6,6,12,12,
6,12,12,12,,6,6,,12,18,,6,6,6,18
,12,,18,6,,18,18,,12,12,,12,,,6,
12,12,18,,,12,12,12,12,12,12,12,
12,12
20 DATA 6,12,,6,6,,18,12,,6,6,6,
12,18,,18,18,,18,18,,001,011,111
,011,011,111,100,001,111,011,011
,011,000,101,111,000,110,111,000
,010,111
30 CLS:PRINT:PRINT"<P>ractice?":
EXEC44539:POKE500,ASC(INKEY$):PR
INT"INITIALIZING, PLEASE WAIT...
":PLAY"P1":DATA 011,001,111,001,
111,111,011,001,101,000,111,111,
011,001,011,001,011,011,001,011,
001
40 DATA101,001,111,011,011,111,0
01,100,111,011,011,011,101,000,1
11,011,000,111,010,000,111
50 DATA001,101,111,001,111,111,1
01,001,011,000,111,111,101,001,1
01,101,101,001,001,101,001
60 POKE65497,0:PCLEAR1:CLEAR1000
:PALETTE0,63:PALETTE1,0:PALETTE2
,37:PALETTE3,37:PALETTE4,10:PALE
TTE5,7:PALETTE6,56:PALETTE7,36:P
ALETTE8,38:PALETTE9,35:FORK=11TO
15:PALETTEK,0:NEXT:DIMM(30),L(38
,1),T(38,2):POKE&HE6B7,&H39:HSCR
EEN2:POKE&HE6B7,&H20
70 FORK=1TO28:HBUFFK,120:NEXT:HB
UFF29,3100:HBUFF30,120:HBUFF41,1
20:FORK=31TO40:HBUFFK,65:NEXT:M(
29)=RND(28):T=RND(-TIMER):L=5:B$
="R5D5L5U5BF2RDL":FORK=1TO14:REA
DL(K,0),L(K,1):L(K+14,0)=L(K,0):
L(K+14,1)=L(K,1):NEXT:FORK=1TO28
:READT(K,0),T(K,1),T(K,2)
80 NEXT:POKE&HE6C6,33:HCLS1:FORK
=1TO28:FORY=1TO3:READA$:H=0:FORX
=1TO3:H=X*6-6:V=Y*6-6
90 IFMID$(A$,X,1)="0"THENHDRAW"C
9BM=H;,=V;"+B$:NEXTX,Y:ELSEHDRAW
"C1BM=H;,=V;"+B$:NEXTX,Y
100 HGET(0,0)-(L(K,0),L(K,1)),K:
NEXTK
110 HCLS1:HDRAW"A0C3BM129,50D92R
61U92R20D108L102U108R20":HPAINT(
128,60),3,3:HDRAW"C0BM108,59R21B
R61R20C3BM16,65NR94":FORK=1TO22:
HDRAW"FD3":NEXT:HDRAW"FDFDFRFR3F
R230EUE":FORK=1TO7:HDRAW"U11E":N
EXT
120 HCOLOR5:HPRINT(14,0),"*Steve
dores*":HCOLOR4:HPRINT(12,1),"BY
 Grant Bloedow"
130 HDRAW"C3EU7L84C6BM15,54R92D1
0L92U10BM211,54R80D10L80U10
140 HPAINT(28,69),3,3:HPAINT(16,
59),6,6:HPAINT(212,59),6,6:HCOLO
R5:HPRINT(2,7),"U.S.S.Grant":HCO
LOR1:HLINE(108,32)-(210,54),PSET
,BF
150 HDRAW"C8BM90,30":FORK=1TO22:
HDRAW"E5RG5BR4H5RF5":NEXT:FORX=0
TO1:H=X*132+80:HDRAW"BM=H;,52":F
ORK=1TO3:HDRAW"E7RG7BR7H7LF7BH7"
:NEXTK,X:HDRAW"BM89,31R123NR7D22
R8U22R3U7L135D29L8U22R8U18HL16GD
17FR16U7L12U9R12C5":HPAINT(77,30
),8,8
160 A$="C5BM78,23NR2ELU2EC9NRURE
C7HLFL2DBF2C6LDR2G":HDRAWA$+"R4C
9UC5BD2R0C1":HGET(78,16)-(86,23)
,31:HDRAWA$+"R2C9UC5BD2R0C1":HGE
T(78,16)-(86,23),33:HLINE(78,16)
-(86,23),PSET,BF:HDRAWA$+"R5C9UC
5BD2R0C1"
170 HGET(78,16)-(86,23),32:HCOLO
R4:HLINE(0,161)-(319,191),PSET,B
F:HDRAW"BM0,160NR46UNR42UNR40UR3
9UL39UR38UL38BM319,160NL41UL40UR
40UL39UR39UL39UR39
180 HDRAW"C0BM232,31NR20U3EU3EU3
EU3R20D3GD3GD3GD3LBM225,53C5NR45
UC6R45U20L45D20BE5R10NU5R10U5L20
ND10BFC4D3R8UL8UR8UNL8BR2R8DL8DR
8DL8":HPAINT(235,30),0
190 HPAINT(226,50),6,6:HDRAW"BU4
C5NR8L11D5R19U5BM245,31C5U10LUR2
DLDRC4RDLERC3R4BD2NL6BD2L6UC0R6B
U2L4":HGET(244,19)-(252,31),35:H
COLOR0:HLINE(244,19)-(252,31),PS
ET,BF:HDRAW"BM245,31C5U10LUR2DLD
RC4RGR2C3R2ERBD2LGL2HLBD2RFR2ERU
C0LGL2HLRER2ER"
200 HGET(244,19)-(252,31),36:HCO
LOR0:HLINE(244,19)-(252,31),PSET
,BF:HDRAW"BM245,31C5U10LUR2DLDRC
4DRGC0RC3FD2FBD2H2U2H":HGET(244,
19)-(252,31),34
210 HDRAW"BM272,161C1R3GR3GR3GR3
GR3GR3D2L2UR6HC6D2HR2":HGET(287,
160)-(289,174),38:HDRAW"C1R0BL2R
0FC6FL2DR2GBU5EL2UR2H":HGET(287,
160)-(289,174),39:HDRAW"RULGU2R2
HD12HD2FURU2":HGET(287,160)-(289
,174),40
220 HDRAW"BM165,31C9D3C8RL2GLR6F
L8DR8DC5L8DC6R8":HGET(154,31)-(1
75,39),41
230 HDRAW"BM235,15C11R0E2C12DBRR
0BGC11R0RBE3C13E":FORK=1TO50:HSE
T(RND(25)+245,15-RND(14),10+RND(
4)):NEXT
240 HSCREEN2:GOTO260
250 T=0:M(1)=M(29):FORK=2TO30:M(
K)=RND(28):NEXT:L=L-.5:SC=SC+(5-
L)*50:PLAY"V31;T255L255O5;1;2;3;
4;4;5;5;6;6;5;4;2;O5;1;2;3;5;7;8
;10;11;12":IFL<1THENL=1:RETURNEL
SERETURN
260 GOSUB250:X=160:SC=0:PLAY"T25
5L255
270 POKE65497,0:HCOLOR1:HLINE(X-
5,32)-(X+14,39),PSET,BF:HCOLOR6:
HLINE(211,56)-(290,63),PSET,BF:S
C$=STR$(SC):HCOLOR5:HPRINT(26,7)
,SC$:X=160:Y=40:HPUT(X-5,31)-(X+
14,39),41,PSET:IFSC>99999THEN400
280 T=T+1:P=M(T):R=M(T+1):HCOLOR
1:HLINE(94,33)-(113,51),PSET,BF:
HPUT(94,33)-(93+L(R,0),33+L(R,1)
),R,PSET
290 TIMER=0:E=0:IFT>28THENGOSUB2
50:GOTO280
300 E=INT(TIMER/60):HPUT(X,Y)-(X
+L(P,0),Y+L(P,1)),P,PSET:A$=INKE
Y$:IFPEEK(343)=247ANDX>121THENHC
OLOR1:HLINE(X,Y)-(X+L(P,0),Y+L(P
,1)),PSET,BF:X=X-6:HPUT(X-5,31)-
(X+14,39),41,PSET:HPUT(78,16)-(8
6,23),31:GOTO300
310 IFPEEK(344)=247ANDX<180THENH
COLOR1:HLINE(X,Y)-(X+L(P,0)+6,Y+
L(P,1)),PSET,BF:X=X+6:HPUT(X-5,3
1)-(X+14,39),41,PSET:HPUT(78,16)
-(86,23),32,PSET:GOTO300
320 IFPEEK(342)=247ANDX<180THENH
COLOR1:HLINE(X,Y)-(X+L(P,0),Y+L(
P,1)),PSET,BF:P=P+7:IFP>28THENP=
P-28:GOTO300
330 IFPEEK(341)=247ANDX<180THENH
COLOR1:HLINE(X,Y)-(X+L(P,0),Y+L(
P,1)),PSET,BF:P=P-7:IFP<1THENP=P
+28:GOTO300
340 IFA$=CHR$(32)ORE>L ANDPEEK(5
00)<>80THENHPUT(78,16)-(86,23),3
3,PSET:HCOLOR1:HLINE(X,Y)-(X+L(P
,0),Y+L(P,1)),PSET,BF:FORF=Y TO1
60STEP6:HGET(X,F)-(X+L(P,0),F+L(
P,1)),30:HPUT(X,F)-(X+L(P,0),F+L
(P,1)),P,OR:SC=INT(SC+L-E):ELSE3
00
350 PL=0:FORQ=1TO3:IFT(P,Q-1)=0T
HENNEXTQ:ELSEIFHPOINT(X+Q*6-6,F+
T(P,Q-1))<>1THENPL=PL+1:NEXTQ:EL
SENEXTQ
360 A$=INKEY$:IFPL>0THENPOKE6549
6,0:PLAY"O1V31EAV20CV10GFV3ADE":
POKE65497,0:SC=SC+5:ELSE:HPUT(X,
F)-(X+L(P,0),F+L(P,1)),30,PSET:N
EXTF:PL=0
370 IFF<59THENEXEC43345:GOTO400E
LSEFORV=F+L(P,1)TOF-18STEP-6:PL=
0:FORH=0TO9:IFHPOINT(H*6+130,V)<
>1THENPL=PL+1:NEXTH
380 IFPL=10THENHGET(130,V-6)-(18
9,50),29:HPUT(130,V-6)-(189,50),
29:HPUT(130,V)-(189,56),29,PSET:
POKE65496,0:PLAY"O1V31EGV25ADV15
BADV10FEV4ADBV1AEF":POKE65497,0:
SC=SC+25:V=V+6
390 NEXTV:GOTO270
400 PLAY"L255T255O1V20C;C;CO1V31
D;D;D;D;D;DV20D;D;DV5D;D;P1P1P1P
1V20D;D;V31D;C;D;DV25DDDV20DDCDV
10DDDDV5DCDDV1DDCDT255":A$=INKEY
$:HCOLOR0,4:HPRINT(16,22),"GAME
OVER":HPRINT(14,23),"PRESS ANY K
EY":C=37:Q=1
410 T=TIMER/60:POKE65496,0:PLAY"
V30IAGP3;"+STR$(RND(12)):A$=INKE
Y$:IFA$<>""THEN430ELSEHPUT(244,1
9)-(252,31),RND(3)+33,PSET:C=C+Q
:PLAY"V10I;"+STR$(RND(9)):HPUT(2
87,160)-(289,174),C,PSET
420 IFT>29THENELSEIFC=40THENQ=-1
:GOTO410ELSEIFC=38THENQ=1:GOTO41
0ELSE410
430 HCOLOR4:HLINE(110,175)-(213,
191),PSET,BF:HCOLOR1:HLINE(130,3
2)-(189,141),PSET,BF:HLINE(108,3
2)-(210,54),PSET,BF:HPUT(244,19)
-(252,31),34,PSET:A$=INKEY$:GOTO
260
```

Sorting out bits and bauds in your quest for online communication

A Brief Introduction to Modems

by Gary C. Kessler

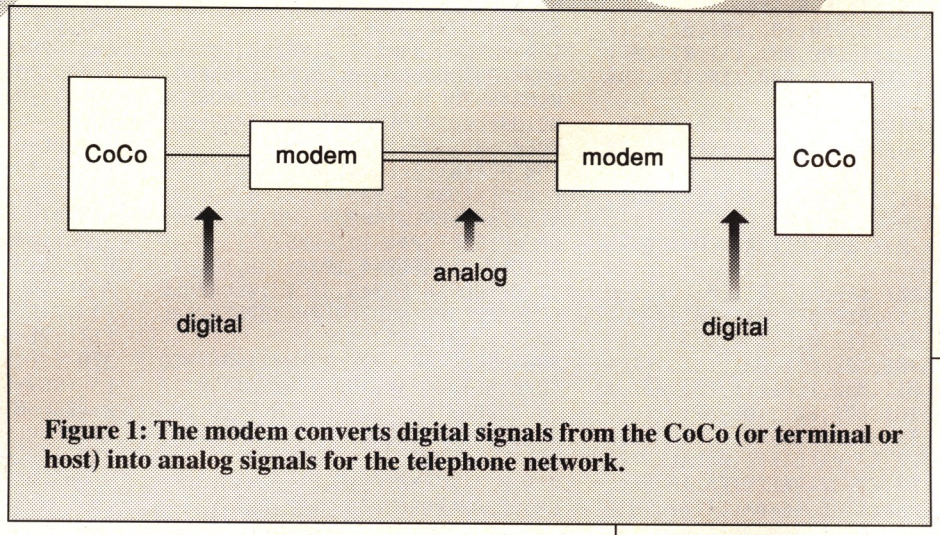


Figure 1: The modem converts digital signals from the CoCo (or terminal or host) into analog signals for the telephone network.

This article introduces the topic of data communications over analog telephone lines using modems and discusses modem standards and function. Reference material includes J.E. McNamara's third edition of *Technical Aspects of Data Communication* (Maynard, Massachusetts: Digital Press, 1988) and W. Stallings second edition of *Data and Computer Communications* (New York: Macmillan, 1988.)

For our purposes keep in mind that we are describing *digital data* being transmitted as *analog signals*. Digital data, or digital signals, are those that consist only of discrete values, such as the data from a computer. Binary data is a special case of digital where there are only two possible choices: 0 or 1.

Analog signals, or analog data, consist of any value within a range of values. Human voice is an example of analog signals. Since the telephone network was built specifically for the transmission of human speech, it is designed to carry analog signals. (In fact a large portion of the telephone network carries human voice in digital form, but the local connection between the home and the telephone network is still almost exclusively analog.)

As an example of discrete and continuous values, consider numbers. The set of integers is discrete; there is no integer value, for example, between 3 and 4. Real numbers, on the other hand, are continuous since there are an infinite number of real numbers between any two given numbers.

In any case here is where the modem comes in. *MODEM* is an acronym for *MO*dulator-*DEM*odulator. Its function is to convert digital data from a host computer or terminal into analog signals for the tele-

Gary Kessler is a data communications and computer networking consultant. He may be contacted at 5 Creek Glen, Colchester, VT 05446-3641, (802) 879-3375.

Breaking the Modem Code

Ever wonder what those lights on the front panel of your modem are? Do their labels (CD, RD, ARQ, etc.) leave you mystified? And how about all those AT commands you've heard about? What's ATDT and ATMO?

If you've ever wondered about these elements of your modem, you'll want to read this guide and reference to modem status indicators and commands. You should read it even if you haven't been wondering about these great mysteries of the universe because understanding your modem and knowing how to talk to it make troubleshooting and controlling telecommunications easy.

Listening to Your Modem: Status Indicators

First let's take a look at those lights on your modem's front panel. They can provide a lot of information about what your modem is up to, as

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well as the status of a call. Here's the breakdown:

AA — This indicator is on when your modem is set to *Auto Answer* mode and while it is connected with a modem that has called it.

ARQ — This is an indicator that automatic error control (*Automatic Repeat Request* or MNP) is in effect between modems.

CD (or DCD) — CD stands for *Carrier Detect* and means that your modem has detected a carrier signal from another modem — or thinks it has. Your modem detects a signal when it communicates with a modem, either by calling it (as the originating modem) or by answering a call (as the answering modem). Your modem can be fooled into thinking it has detected a carrier if you turn its carrier detect override switch to *On*. This is required by some software and by direct connections.

CS (or CTS) — Short for *Clear to Send*, CS flashes when your modem sends a signal to your computer that it's OK to send more data. This typically happens several times per second.

HS — This is the *High Speed* indicator, which is on whenever you set a speed of 1200 or 2400 bits per second (bps) with most modems or higher speeds with some. If it is not on, you are operating at your modem's slowest possible speed (usually 300 bps).

MR — This one's easy: It means *Modem Ready* and indicates that the power is on. If your modem is capable of performing an offline self-test, it flashes during the test.

OH — OH stands for *Off Hook*, and it means your modem has opened the telephone circuit, figuratively "taking the phone off the hook." The OH indicator comes on when your modem is dialing and stays on during the ensuing connection.

RD (or DR) — This indicator flashes when a data bit is received from a remote system (it stands for *Received Data*), or when the modem is sending result codes (explained later in this article) to your computer. The RD indicator flashes as characters appear on your computer's screen; if a data transfer is in process, it should flash rapidly in concert with the SD indicator.

RS (or RTS) — This is a *Request to Send* signal indicator; it is on when the modem is on if the computer's RS-232C port uses the Request to Send pin (Pin 4). This indicator flashes on and off if the RS-232C port is controlling data flow; otherwise it stays on.

SD (or DS) — This is the *Send Data* indicator; it flashes when a data bit is sent to the modem by your computer. The SD indicator should flash whenever you type anything on your keyboard. If a data transfer is in process, it should flash rapidly in concert with the RD indicator. (Note: If the RD and SD indicators stop flashing and/or either stays on for more than a few seconds during a protocol — Xmodem, Kermit, etc. — transfer, you should abort the transfer. Unless these indicators are flashing, data is not being exchanged.)

TR (or DTR) — You probably guessed this one: *Terminal Ready* (or *Data Terminal Ready*). This is on when the modem receives a signal from the computer (terminal) that it is ready to receive data. Some communications programs require that this be "forced" on by setting the modem's DTR override DIP switch to *On*. This eliminates hardware flow control and allows the software to have complete control over the rate of incoming data.

Your modem may not have all these indicators, but it should be equipped with CD, HS, MR, RD, phone network and to convert analog signals into digital form (see Figure 1).

Baud vs. Bit Rate

Before discussing modems any further, we must define two important communications terms: baud and bit rate. The *baud* of a device refers to its signaling rate, or the number of signals generated per unit time. Thus a 2400-baud modem sends 2400 signals per second. The *bit rate* refers to the number of bits sent through a communications channel per unit time. Therefore a 2400 bit-per-second (bps) device transmits 2400 bits per second.

The terms baud and bit rate do not refer to the same thing.

The terms baud and bit rate do not refer to the same thing. The relationship between the two depends upon the number of bits transmitted with each signal. As we will see, a 2400-baud modem and a 2400-bps modem are very different devices. While many readers of this article have used a 2400-bps modem, I'd guess that relatively few have ever used a 2400-baud modem.

Telephone Network Basics

To understand modems and their use, it is necessary to understand some basics about the local telephone line and analog signals.

People speak by forcing air over their vocal cords. The vibration of the vocal cords in turn causes vibrations in the air, interpreted by the ear as sound. These vibrations are basically a combination of *sinusoidal* (sine) waves (Figure 2).

While humans can generate tones in the range of 50 to 15,000 cycles per second (Hertz, or Hz) and the ear can detect sounds in the range of 20 to 20,000 Hz, the dial-up telephone network is optimized for human speech and carries signals in the range of only about 300 to 3400 Hz. (The reasoning behind this choice and the reason that the telephone network carries the human voice with high quality even in such a narrow band is beyond the scope of this article.)

Without going too much into communications theory, it is worth mentioning Harry Nyquist's Theorem, which specifies the theoretical maximum signaling rate on a communications channel. Since the telephone network passes sounds in the range of 300 to 3400 Hz, it is said to have a band

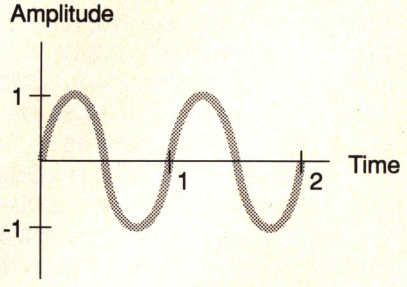

Figure 2; Sine wave with an amplitude of 1, and phase shift of 0^0.

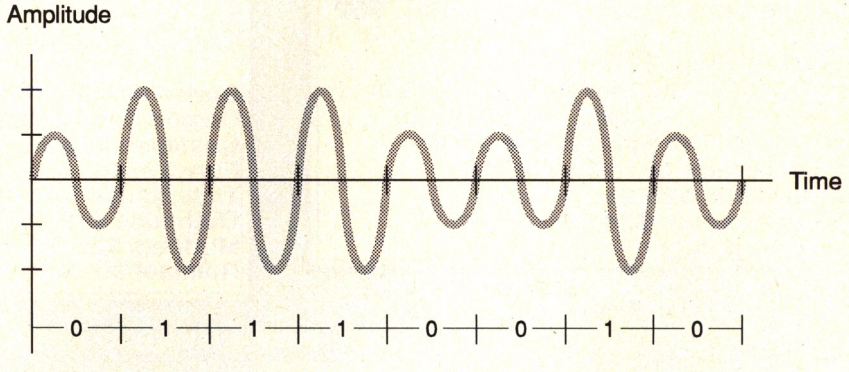

Figure 3: Amplitude Shift Keying (ASK). The low and high amplitude sine waves represent a 0 and 1, resoectuvely. Note that ASK does not affect frequency and phase shift.

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SD and TR indicators unless it has no indicators at all.

Taking Command of Your Modem

Now that you have an idea of what your modem is doing, let's take a look at how to use direct commands to make it do what you want it to do.

Did you buy a used modem without a manual or lose your modem's manual? If so, you may be missing quite a bit in terms of command access to your modem. Fortunately most modems use the de facto AT command set, so-named because most of the commands must be preceded by the attention signal AT. These are the same commands your communications software uses to communicate with your modem, by the way.

A summary of AT commands follows. Note that the commands listed in the table are those commonly used in dialing and answering operations. Your modem may offer additional commands for configuration, setup and self-diagnostics, particularly if it is a Hayes modem.

Some modem manufacturers (such as U.S. Robotics and Hayes) use what is called an *extended* AT *command set*. This is a set of specialized commands — based on the AT command set — used to access their modems' special features. The AT commands shown in the list also operate with such modems of course.

Entering Commands

Commands can be typed in upper- or lowercase. With the exception of +++ and A/ all commands must be preceded by AT, and all are implemented by pressing ENTER. They can also be included in script files.

On most modems if you type a command that requires a numeric option and do not include the option, the option is assumed to be zero. For example, if you type ATH, the modem responds as if you've typed ATH0.

Try these commands with your modem; if a command or a command with a numeric option doesn't work, you'll either see an error message or the command will be ignored. Either way you can't hurt anything, and you may learn that your modem is more powerful than you thought.

Standard Commands

+++ — This is the *attention* command or escape code. This code, when entered via keyboard while no data is being transferred between the local system and the remote system, switches the modem to command mode, during which time anything you type is intercepted by the modem and interpreted as a command. The connection is maintained by the modem except in the special situations described below. To return online and cause the modem to resume sending input to the remote system, type ATO.

Being able to send commands directly to the modem while it is connected can be useful, especially in situations where you need to override parameters set by software or turn a feature such as a character echo on or off.

If a modem is using ARQ error-detection mode or if it is equipped with an *Escape Code Operations* DIP switch (usually Switch 9) set to *Off*, the modem disconnects when you enter +++.

A — This command forces the modem to answer an incoming call if it doesn't respond.

A/ — A/ causes the modem to repeat the most recent command (used only with modems that store commands in a command buffer; will not recall a command if the command buffer has been

width of 3100 Hz, or 3.1 kHz (i.e., 3400 - 300 = 3100). Nyquist's Theorem says that the maximum number of signals that can be sent through a communications channel is twice the band width of the channel. Thus a device attached to the telephone network could theoretically only operate at 6200 signals per second (baud).

This points immediately to a difference between the terms *baud* and *bps*. Many vendors sell 9.6-, 14.4- and 19.2-kbps modems for operation over the dial-up telephone network. They obviously could not work at 9600, 14,400 or 19,200 baud.

Nyquist's Theorem shows that the maximum signaling rate depends upon the band width of a channel. Claude Shannon's Theorem states that the maximum bit rate of a communications channel is related to the band width and the amount of noise on the channel. The analog, dial-up telephone network has a signal-to-noise ratio (SNR) of at least 1000:1 and, remember, a band width of 3.1 kHz. Thus the theoretical channel capacity is about 30,000 bps.

Modulation Techniques

So how does a modem work? Basically a modem merely changes one or more of the characteristics of a sine wave. These changes, or *modulations*, can take several forms.

Figure 3 shows amplitude modulation, also called *Amplitude Shift Keying* (ASK). The amplitude of a sine wave is detected by the ear as volume. The figure shows two-level coding — i.e., two amplitude levels are defined and a single signal indicates the value of a single bit. In this example the low amplitude signal is a 0, and the higher amplitude is a 1.

ASK by itself is never used in modems.

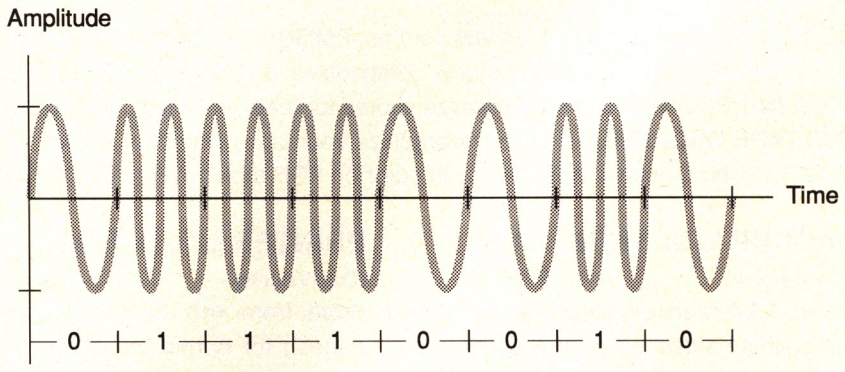

Figure 4: Frequency Shift Keying (FSK). The low and high frequency sine waves represent a 0 and 1, respectively. Note that FSK does not affect amplitude and phase shift.

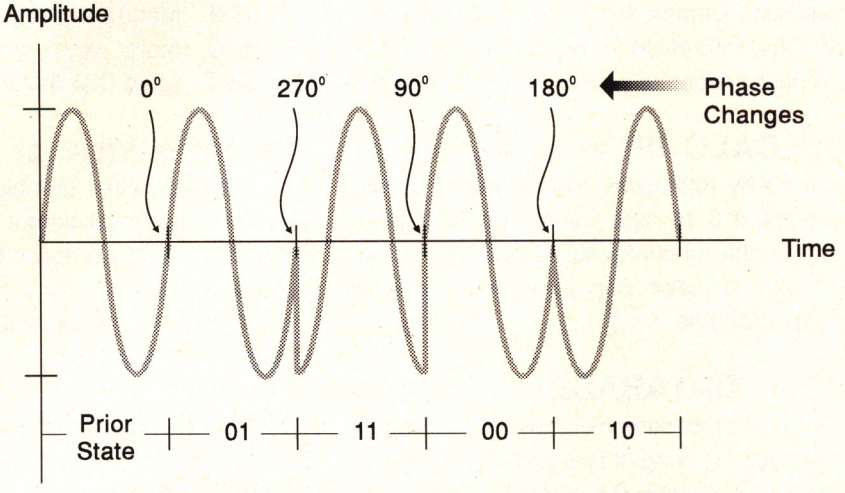

Figure 5: Differential Phase Shift Keying (DPSK). Phase changes in signal represent a pair of bits (dibit). Note that DPSK does not affect amplitude and frequency.

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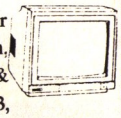

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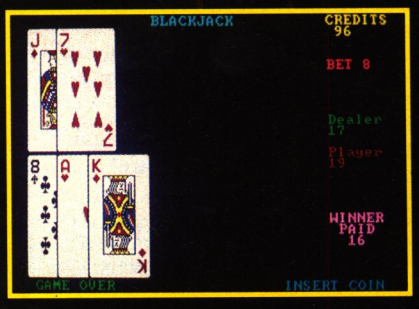

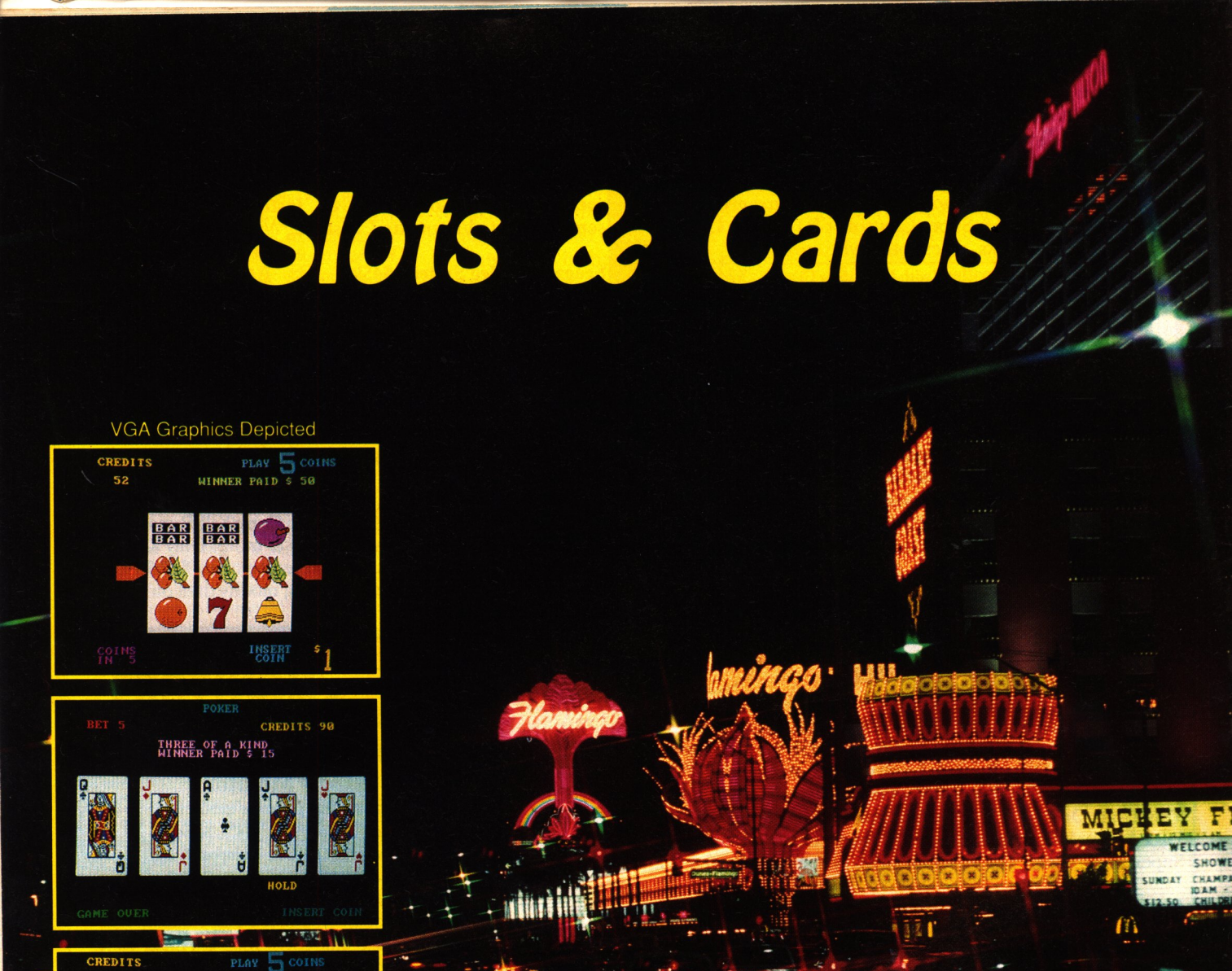

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cleared by turning off the modem or issuing the AT command; see below). This is useful in offline parameter settings or if you want to redial a number.

^C — This aborts the display of a modem's help screen (^K is sometimes used as well).

^S/^Q — When the modem is in Command mode, these are flow-control characters. Use ^S to pause the display of information, such as help screens, from the modem; use ^Q to resume the display.

AT — Short for *ATtention*, this command "wakes up" or initializes a modem. Used alone, it clears the command buffer (which means that A/ will not recall the last real command). AT must precede all modem commands, with the exception of +++, A/ and control-character commands.

ATA — This toggles a modem to answer mode; use this to manually answer an incoming call.

ATCx — ATC turns a modem's transmitter on and off. ATC0 turns the transmitter off so the modem will receive only (useful in direct connections). ATC1 turns the transmitter on (the default).

ATDx — This is the standard modem dial command (*D* is for *Dial*). Typically used with one or more options (*x*), followed by a phone number. When entered with an option and phone number, this sets a modem to Originate mode and dials the number. The basic options for use with ATD are P

Quadbit	Relative Amplitude	Phase Shift	Quadbit	Relative Amplitude	Phase Shift
0 0 0 0	$\sqrt{2}$	45°	1 0 0 0	$3\sqrt{2}$	45°
0 0 0 1	3	0°	1 0 0 1	5	0°
0 0 1 0	3	90°	1 0 1 0	5	90°
0 0 1 1	$\sqrt{2}$	135°	1 0 1 1	$3\sqrt{2}$	135°
0 1 0 0	3	270°	1 1 0 0	5	270°
0 1 0 1	$\sqrt{2}$	315°	1 1 0 1	$3\sqrt{2}$	315°
0 1 1 0	$\sqrt{2}$	225°	1 1 1 0	$3\sqrt{2}$	225°
0 1 1 1	3	180°	1 1 1 1	5	180°

Table 1: Amplitude and Phase Changes for Each 4-Bit Quantity (*Quadbit*) per CCITT Recommendation V.29 (9600 bps, 2400 baud)

The reason is that background noise, which exists on nearly all communications channels, is additive and affects the amplitude of the signal. Thus ASK is a notoriously unreliable modulation technique.

Frequency modulation, or *Frequency Shift Keying* (FSK), alters the frequency of the sine waves (Figure 4). Varying frequencies are detected by the ear as changes in pitch. In the figure the low-frequency tone is a 0 while the high frequency tone is a 1; this is also a two-level coding scheme, sending one bit per signal. FSK modems are commonly used today for low-speed applications; typically a single bit is sent with each signal.

As an example consider the Bell 103 modem standard. A Bell 103 modem operates at a speed of 0 to 300 bps (and 0 to 300 baud). Full-duplex communication is achieved by defining forward and reverse frequencies. Tones of 1070 and 1270 Hz are a 1 and 0, respectively, in one direction while 2025 and 2225 Hz tones represent 1 and 0, respectively, in the other direction. The calling modem usually uses the lower frequencies whereas the called modem usually uses the higher frequencies.

The final characteristic of a sine wave that can be modulated is the *phase angle* of the signal. Two out-of-phase sine waves result in a low-frequency hum such as that heard when tuning the strings of a piano or guitar. Modems using phase modulation usually use a technique called *Differential Phase Shift Keying* (DPSK).

Figure 5 shows an example of DPSK. The figure shows four-level coding; four different phase angles are defined so that each signal carries two bits. The following table shows the bit pair (*dibit*) values and the phase shift in the signal associated with each bit pair. These values are taken from the Bell 212 (1200 bps, 600 baud) standard:

Dibit	Phase Shift
00	90°
01	0°
10	180°
11	270°

The bit pair 00, for example, is transmitted by shifting the phase of the signal by 90° with respect to the previous signal sent; a 10 is represented by a 180° phase shift. DPSK is commonly used in moderate-speed modems operating at 1200 and 2400 bps.

Another commonly used modulation scheme, *Quadrature Amplitude Modulation* (QAM), combines both amplitude and phase modulation. QAM is used in higher-speed modems operating at 2400 bps and above. QAM signaling alters the amplitude and/or phase angle of a signal compared with the prior signal. Table 1 lists the amplitude and phase changes for each 4-bit quantity (*quadbit*) per CCITT Recommendation V.29 (9600 bps, 2400 baud).

As an example, if the 4-bit pattern 0100 were transmitted, the next sine wave sent would have a relative amplitude of 3 and would be shifted by 270° from the prior signal.

Modem Standards

There are two main sources of modem standards in use today: the Bell standards

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Modem Standard	Bit Rate	Signaling Rate	Modulation Technique
103	300	300	FSK
V.21	300	300	FSK
212	1200	600	DPSK
V.22	1200	600	DPSK
V.22*bis*	2400	600	QAM
V.26*ter*	2400	1200	DPSK
V.27	4800	1600	DPSK
V.29	4800	2400	QAM
V.32	4800	2400	QAM
V.29	7200	2400	QAM
209	9600	2400	QAM
V.29	9600	2400	QAM
V.32	9600	2400	QAM

Table 2: Common Bell and CCITT (V-Series) Modem Standards and Bit Rate, Baud and Modulation Technique Associated With Each

and CCITT V-series recommendations. Bell standards apply mostly to lower-speed modems and were developed during those years when AT&T and the Bell system owned and operated the U.S. telephone network.

The International Telegraph and Telephone Consultative Committee (CCITT) is a committee of the International Telecommunication Union (ITU), an agency of the United Nations. CCITT V-series recommendations address digital communication over the analog telephone network.

Table 2 lists some of the most common Bell (103, 212A and 209) and CCITT (V-series) modem standards and the bit rate, baud and modulation technique associated with each. Some of the standards are listed more than once since they support fallback speeds in case the higher speed cannot be achieved for a given call.

Modem standards are very important because they allow users to determine the compatibility between a pair of modems. For example, although Bell 212 and CCITT

and T. ATDP causes the modem to dial using pulses. ATDT causes the modem to dial using tones. A typical dial-up sequence would be ATDT3711925.

Other options you may be able to use are:

,	Pause for two seconds
;	Switch to Command mode after dialing
"	Dial the letters that follow as numbers
@	Wait for an answer (do not "time out" after a certain number of rings).
R	Use when calling a modem that cannot answer incoming calls.

These options can appear anywhere in the command string after P or T.

ATDS — With modems that are so equipped, dials a number stored in RAM.

ATEx — This command turns Command-mode character echo on and off. ATE1 turns Command-mode character echo on, causing the modem to echo what you type when in Command mode. ATE0 turns Command-mode character echo off (the default). Useful when you are entering dialing and other commands manually so you can see what you are entering.

ATFx — ATF enables or disables the echo of data transmitted from a computer. ATF0 turns the local echo on; this status, also known as *half duplex*, echoes what you type to your screen as well as sending it to the remote system, and echoes data received back to the remote system.

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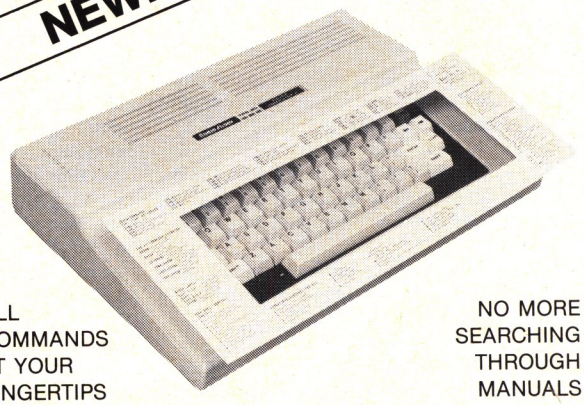

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ATF1 turns local echo off; this status, also known as *full duplex*, disables echoing what you type and disables echoing data received from the remote system (this is the default). This command is useful when you dial up a system that doesn't echo what you type because it is operating at full duplex.

ATHx — This is the *on hook/off hook* command. ATH0 hangs up (disconnects) the phone line, also known as going on hook. ATH1 opens the phone line, also known as going off hook. (You'll use ATH0 more frequently.)

ATIx — This is an *inquiry* command; when followed by a number between 0 and 5, the modem responds with information about itself or its settings, such as this:

- ATI0 Displays a product code or the current speed setting.
- ATI1 Performs a ROM test.
- ATI2 Performs a RAM test.
- ATI3 Displays call duration or current time, depending on ATKx setting.
- ATI4 Displays current settings.
- ATI5 Displays NRAM settings.

ATKx — This command determines whether the ATI3 command displays the current call duration or the real time. ATK0 causes ATI3 to display the call duration; ATK1 causes ATI3 to display the current time. (To set the time on most modems with the ATI3 command, type ATI3=HH:MM:SS K1.)

ATMx — ATM controls a modem's speaker. ATM0 turns the speaker off. ATM1 sets the speaker to stay on until a carrier is detected (this is the default setting on most modems). ATM2 sets the speaker so that it will be on at all times — before, during and after a call. ATM3 sets the speaker to turn on after the dial string is received by the modem, then turn off at carrier detect.

ATO — This command returns you to the online mode from the command mode if you've entered the command mode using +++.

ATP — Sets the dial mode to pulse (this is the default). Many modems do not accept this alone, requiring you to use ATDP instead.

ATQx — ATQ0 disables the display of call result codes (see below). ATQ1 (the default) turns on the result codes.

ATSxn — On modems with addressable registers (bit settings in RAM), these allow you to customize certain settings. In the ATSxn command string, *x* is the register number and *n* is the numeric value placed in it. (See your modem's manual for information on register settings.)

ATSx? — This command is a query that displays the setting of the register specified.

ATT — Sets the dial mode to tone. Many modems do not accept this alone and require you to use ATDT instead.

ATVx — This command sets up the modem to display result codes as numbers (ATV0) or letters (ATV1, the default).

ATXx — On modems that support this feature, ATX followed by a number 1 through 6 enables the display of up to 12 result codes and turns on up to four features (adaptive dialing, wait for second dial tone, etc.).

ATZ — ATZ resets the modem to its default parameters, canceling any settings you may have made using the preceding commands.

Advanced Commands

AT& — This is a prefix for advanced commands, which are not available on all modems. (To find out if a modem offers the advanced command set, type AT&$.)

Help Commands

AT$ — On modems that have online help, this displays a summary of extended commands and options.

AT&$ — On modems that have online help and support the extended command set, this command displays a summary of extended commands and options.

ATD$ — On modems with online help, this command displays a summary of dial commands.

ATS$ — On modems with settable registers, this command displays a summary of register settings.

Modem Command and Dial Result Codes

0 OK — Displayed after you have entered a parameter setting command properly, to let you know the command was acted on.

4 ERROR — Displayed if you enter something that is not a command or if you enter a command using the wrong syntax or an impossible option number.

1 CONNECT — Displayed when a remote system answers, an advanced result codes option (ATX1 through ATX6) is not set.*

5 CONNECT 1200 — When an advanced result codes option is set, this is displayed when the modem senses a remote system answering at 1200 bps.*

10 CONNECT 2400 — When an advanced result codes option is set, this is displayed when the modem senses a remote system answering at 2400 bps.*

3 NO CARRIER — This is displayed when a remote system disconnects.

6 NO DIAL TONE — This is displayed when the modem attempts to make a call and can't get a dial tone.

7 BUSY — When the modem makes a call and detects a busy signal, it displays this message and disconnects.

2 RING — Displayed each time the phone rings after a call is made until the remote system answers or the number of rings required to display NO ANSWER is reached.

11 RINGING — At higher ATX settings this replaces RING.

8 NO ANSWER — The modem displays this setting (rather than NO CARRIER) and disconnects after a predetermined number of rings if you have used the @ option with a dial string.

12 VOICE — When the modem makes a call and detects a voice answering, it displays this message and disconnects.

*If a modem has Automatic Repeat Request error protocol, it may display CONNECT/ARQ, CONNECT 1200/ARQ, or CONNECT 2400/ARQ with certain extended command and DIP switch settings.

— Michael A. Banks

V.22 modems both use DPSK and operate at 1200 bps, a Bell 212 modem cannot communicate with a V.22 modem since the phase angle shifts are different. It is important, then, to check the standard(s) supported by a given modem to ensure its compatibility with other modems.

Table 2 also demonstrates clearly the difference between baud and bit rate. I understand the reality of advertisements for 300-, 1200- and 2400-baud modems; I would observe that, technically speaking, most of those advertisements are not correct. I would further claim that most people don't care about the signaling rate anyway; they only care about the bit rate.

Final Comments

Several final comments should be made. Many people would like to be able to convert the bit rate of a modem to a character transmission rate. The bit rate can usually be converted to character transfer rate by dividing the bit rate by 10 (i.e., a 300-bps modem can transfer roughly 30 characters per second). This is only a rough estimate, however. First, it assumes asynchronous transmission using an 8-bit data word and a 1-bit stop interval. Second, a modem may not be able to sustain a calculated character transfer rate due to flow control procedures. Take this conversion, then, with the appropriate grain of salt.

Many modems specify *Hayes compatibility*. This does not refer to a modulation technique; rather, it refers to the user/modem command set, which Hayes calls the *AT*, or *AT*tention, command set. For example, in the Hayes command language, the command AT DT 555-9138 instructs the modem to dial (D) the telephone number 555-9138 using tone (T) rather than pulse dialing. Other command languages use a different syntax for this same instruction. Knowing the command set is necessary before a user and/or communications software package can control a modem. The command language is independent of the modem's operating speed and modulation technique; it merely allows the user to send commands to control the operation of the modem.

Finally, the discussion presented here applies to both internal (as are often used with MS-DOS machines) and external modems. The only difference between these two types is that an internal modem is plugged directly into a computer's back plane and an external modem attaches to a terminal or computer via a serial port, as shown in Figure 1. As far as the telephone network is concerned, its termination is at the modem regardless of whether the modem is inside or outside of the device sending and receiving digital information.

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Shifting Gears

by Marty Goodman
Contributing Editor

The manual for OS-9 suggests there is a dual speed feature with the operating system. How do I access it, and how is it used? Can you recommend a good monochrome monitor for the CoCo 3? Where can I find a list of parts for the CoCo 3? Can I get a better buy if I try to buy a CoCo 3 motherboard without ROM or RAM?

Carl F. Merkel
Kinburn, Ontario

According to several OS-9 experts I have consulted, the dual-speed feature is not useful. The system runs too slowly at single speed. It is true that in BASIC09 you can poke $FF68 with a value and slow down the computer. The only use I can see for this would be to accommodate an improperly designed hardware card that has trouble running at the higher speed.

The pleasantly surprising fact is that most monochrome monitors are of excellent quality, and almost any one should work well. Many persons prefer amber to green screens, and some use black-and-white (closed-circuit TV-type) monitors, but this is mostly a matter of personal preference. There are (or were) literally hundreds of brands made; I am familiar with only a few of them.

Connect your CoCo to whatever monitor you are considering purchasing. There is no substitute for looking at the image on the monitor. All the manufacturer's specs in the world are meaningless without that "proof in the pudding" test.

To the best of my knowledge, the only way to buy CoCo 3s is as whole units. Your best bet is to buy a CoCo 3 on sale. As for parts, just order the service manual for the CoCo 3, and it will list the part numbers. (Prices are not listed in the manual.) You can order the service manual from your local Radio Shack store or from any of a number of THE RAINBOW advertisers, then request price quotes on one or more of the parts you want from Tandy National Parts via your local Radio Shack store.

Hard Drive Controllers

I'm considering buying a used Radio Shack hard drive system for the CoCo 3 (Radio Shack host adapter, and Model 3 10-Meg hard drive and controller). I want to use it with Disk BASIC. Will this work? Is it a good deal at $350?

Harlen Linke (HARLIN)
Mainstee, Michigan

The old Radio Shack host adapter and the hard drive system it works with are *orphan* units. Very few of the host adapters were ever made, and they are not well supported, especially under Disk BASIC (the systems were intended for use only with OS-9.) Furthermore, the going rate for a used 10-Meg drive is around $40 to $80. A SCSI controller can be found for somewhere between $50 and $150. A case and power supply will add another $50 to $100 to the overall cost.

To use a hard drive system exclusively with Disk BASIC, I would recommend RGB DOS from RGB Systems. This is by far the most compatible with existing Disk BASIC programs. RGB DOS works with any SCSI-based hard drive system on the CoCo 3. This means it will work with the host adapters and SCSI controllers from RGB, Owl-Ware or Disto/CRC. Unfortunately, because the (very economical) Burke and Burke hard drive set-up does not use a SCSI controller, but rather is locked into an IBM-style controller that writes 512 (not 256) byte sectors, RGB DOS cannot be used with it. While I tend to recommend Burke and Burke in many situations, if your use is to be entirely Disk BASIC, the RGB software (actually firmware, for it is burned into an EPROM) combined with some SCSI-based host adapter, controller, and hard drive would likely be best for you.

MNP Error-Correction

Can you explain to me about MNP error correction?

Dan Monday (DANMONDAY)
West Bend, Wisconsin

Some of the more expensive 2400- and 9600-baud modems (costing between $170 and $1000) now feature Microcom Networking Protocol in their firmware. Such a modem performs automatic error-checking if it is connected with another MNP modem. Also, if both modems support MNP Class 5, they will perform data compression and decompression, resulting in an effective doubling of throughput in some cases. The error-checking and correction is handled in a way similar to that of Xmodem. The difference is that it is transparent to the user, since it is being done by the modems. All the computer sees is ordinary data going to or from the modem, as if the modem were a normal (non-MNP) modem. The data an MNP modem receives, if it is talking to another MNP modem, will be error free. For this reason, you can transfer files with an MNP-to-MNP connection without Xmodem.

To allow for the higher throughput achieved by the data compression, MNP Class 5 modems that hook up at 2400 baud to the phone line typically connect to the host computer at 4800 or 9600 baud.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Practically speaking, MNP is of limited use to most CoCo users. Between the relatively small size of CoCo files, and the effectiveness of Ymodem and the various CoCo archiving/compression programs, there are few CoCo users who will get real value out of the extra cost of MNP. Similarly, most PC-compatible users will not likely have a need for MNP. Between the excellent archiving and compression programs, and the effectiveness of Zmodem, it is only a minority of users (such as California doctors required by the AMA to do direct billing via MNP modems) who will benefit from spending the extra money for this feature.

Foreign Power Revisited

Can a CoCo 3 be powered by a foreign source of power that is 110 volts, but only 50 (not 60) cycles? What problems will this cause? Are the PIAs and CPUs of Models 26-3127 and 26-3127B CoCo 2s the same? Can they be switched?

TJ Seagrove (TJSEAGROVE)
North Charleston, South Carolina

The CoCo and monitor should both run on a 110-volt, 50-Hz source of power. The only harm possible may be that the transformer will run a bit hot, since its efficiency will be less at 50-Hz. Since the CoCo, the add-on boards (including clock boards), and the monitor derive none of their timing from the power-line frequency, there should be no problems related to improper timing.

The PIAs and CPUs are the same in both the 26-3127 and the 26-3127B CoCo 2s. The only difference between these computers is the video display generator (VDG) chip and the memory manager chip. Note, however, that each CoCo has two PIA chips, and they are not the same. Exchange the 6821 chip for another 6821, and exchange the custom keyboard PIA chip with only another similar custom keyboard PIA chip.

Fried RAM (and Eggs)?

I recently made an interesting discovery. I had fried some memory on a 512K RAM upgrade board for my CoCo 3. I no longer had any 4464 or 41256 chips around, and had to order spares. While waiting for the new chips to arrive, I looked over the circuit for the upgrade and decided the 512K upgrade board might work as a 128K board if I plugged in 4164-15 chips. I had lots of spare 4164 chips; I tried them and it works. So, if you have a DRAM chip die on your 512K board, and if you have spare 4164 chips, you can limp along using them in your upgrade board until you get new 41256 chips.

Dennis McMillian (COCOKIWI)
Pittsburgh, Pennsylvania

Thanks for the tip!

Q & A Grab Bag

I have a CoCo 3 with a GIME chip dated 1987. Is this the latest revision? The memory chips in the machine have a -15 suffix. This means they are 150ns chips. I thought access times of 120ns or better were required. Is the catalog number 26-3334 CoCo 3 the latest one released? Where can I get `modpatch`*? It is not listed in the OS-9 manuals.*

Michael Cheselka
Austin, Texas

The 1987 GIME chip is the latest revision. I recommend 120ns chips, but I have found no reports of problems with the chips rated for 150ns. If the timing for the CoCo 3 is carefully calculated, you will find that, at 2 MHz, access times of about 143ns are required. This is close enough to be within the margins of virtually all 150ns rated chips. Also, catalog number 26-3334 is the only version of the CoCo 3, though other releases had earlier-revision (1986) GIME chips in them. `modpatch` is included with the OS-9 Level II package. However, it is documented in the *Development System* manual from Tandy.

TS/Edit Update

OS-9 users of TS/Edit *will be happy to learn that a new, improved version of the 80-column patch is now available on the Delphi OS-9 SIG.*

Rick Adams (RICKADAMS)
Santa Rosa, California

Sync Separator Simplified

Marty, based on information you gave me about sync-separator circuits, I produced a simplified sync separator that works perfectly for connecting a Tandy CM-8 monitor to a Sega Genesis game machine's RGB output. Here's how to do it.

Send the negative composite sync from the Sega Genesis through a 10K ohm resistor into the base of a general-purpose NPN transistor (2N2222A or 2N4401 or similar). Hook the collector of that transistor to the HSync input on the CM-8. Hook the emitter of that transistor to the base of another NPN transistor. Hook the emitter of this second transistor to ground, and hook the collector of that transistor to the VSync input of the CM-8.

This technique produces a perfect picture on my CM-8 when I use it with my Sega Genesis. The image on the CM-8 is far superior to that produced when I hook a TV or composite monitor to the Sega.

For reference, if you look at the 8-pin Sega Genesis video connector, starting at 1 o'clock (just to the right of the notch) going clockwise, the pins are Red, Audio, +5 volts, ground, Green, Composite Video and Negative Sync at 11 o'clock, with the Blue signal on the center pin.

As most CoCo hackers know, the pinout for the CM-8 is as follows:

Pin	***Function***
1,2	*ground*
3,4,5	*R, G & B inputs*
6	*keyhole — N/C*
7	*audio input*
8,9	*H- and VSync inputs*
10	*ignore/do not use*

Robert Louden
Thornhill, Ontario

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt , type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt , where you can select the "CoCo Consultations"online form, which has complete instructions.

Novices Niche

Your Age in Days
by Richard Barberian

This intriguing program calculates any person's age in the number of days since he was born. Simply enter the current date along with the person's birth date to make this transformation. The program even considers leap years in its calculations! You can also try entering dates of historic events to find out exactly how many days ago they occurred. The calculation can be computed into weeks for a slightly different perspective. Be aware that this program may make you feel a lot older than you really are!

The Listing: AGEDAYS

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 REM ******************
20 REM *** AGE IN DAYS ***
30 REM ******  BY  *******
40 REM RICHARD BARBERIAN JR.
50 REM ******************
60 DIM CM(50),BM(50),M(50)
70 CLS
80 FOR I = 1 TO 12:READ CM(I):NE
XT I
90 FOR I = 1 TO 12:READ BM(I):NE
XT I
100 FOR I = 1 TO 12:READ M(I):NE
XT I
110 INPUT"ENTER TODAY'S DATE IN
FORM      MM,DD,YY";CC,CD,CY
120 INPUT"ENTER BIRTHDATE IN FOR
M         MM,DD,YY";BB,BD,BY
130 CM=CM(CC):TCD=CM+CD
140 BM=BM(BB):BD=M(BB)-BD:TBD=BM
+BD
150 TY=CY-BY:TD=((TY-1)*365)+INT
(TY/4)+TCD+TBD+1
160 IF TD<0 THEN CLS:GOTO 120
170 CLS:PRINT:PRINT:PRINT:PRINT
180 TW = TD/7
190 PRINT TAB(8);"YOU'VE BEEN AL
IVE"
200 PRINT USING"          #,###,
###";TD
210 PRINT TAB(14);"DAYS"
220 PRINT
230 PRINT TAB(14);"AND ":PRINT
240 PRINT USING"           ###.#
##";TW
250 PRINT TAB(13);"WEEKS"
260 PRINT:PRINT:PRINT"   (PRESS
ANY KEY TO CONTINUE)"
270 A$= INKEY$:IF A$=""THEN 270
280 CLS:GOTO 120
290 DATA 0,31,59,90,120,151,181,
212,243,273,304,334
300 DATA 334,304,273,243,212,181
,151,120,90,59,31,0
310 DATA 31,28,31,30,31,30,31,31
,30,31,30,31
```


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Automating the Online Experience

by Dale L.Puckett
Contributing Editor

Since communications is the theme for this month, now seems a good time to think about a program I've needed for a long time. One thing that keeps many people from taking advantage of online services such as Delphi, CompuServe and GEnie is the prohibitive cost. It can take a long time to browse for the answer to a troublesome question or find a well-hidden program online while the meter ticks every second. And if you're a beginner, it can take even longer.

Someone needs to create a way to automate the online process in a program that will allow you to do most of your browsing offline. Wouldn't you then take advantage of the powerful databases found on these services? Why wait for someone else to develop this program when you can write it yourself? I'll show you some concepts this month that may help you to become the author of the next software best seller.

Designing *AutoDelphi*

To get an idea for some features to include in your own automatic Delphi navigator, take a look at Figure 1, which shows a possible menu layout for such a program. The features shown provide an entry-level functionality that you will probably want to enhance later. Feel free to add to your menu the functions you need.

The code needed to set up the Main menu as well as the items on the Session menu are shown in Listing 1. For more details on setting up a menu using `WindInt` and the calls built into Kevin Darling's new version of `gfx2`, review the menu code in the *MVFinance* program (April 1990, Page 52). The `WindInt` module comes with *Multi-Vue*, and it replaces the standard OS-9 `GrfInt` module. The new `gfx2` module is available online in the OS-9 SIGs on Delphi and CompuServe. The *MVFinance* listings in the April and July 1990 issues show several different ways to run procedures that perform tasks selected from a menu.

Let's look at each menu and describe the action needed for each item. As you read about these menus, keep in mind they are *ideas* for a program *you* can write. I'll skip the Tandy menu because it works almost exactly like the Tandy menu in *Multi-Vue*. For information on how to include the Tandy menu functions in your own programs, study the code in the subroutine at Line 1000 of the `DoMenu` program (November 1988, Page 178). Remember, all the procedures from "KISSable OS-9" are available on RAINBOW ON DISK and also online in the RAINBOW ON DISK section of the OS-9 SIG on Delphi. Either source saves you a lot of typing.

On the File menu, New allows you to create a new set of session parameters. For example, you may want to create one session that uses the OS-9 Online SIG of Delphi and another that uses the CoCo SIG. Open allows you to open the session file you need, while Close closes both the window in which the present session is running and the session itself.

Save lets you save the current set of parameters in the session file — use it after you have changed any of a session's settings. Should you edit the current set of parameters and want to save it while keeping the original settings, use the Save As option. With Print you get a hardcopy of a selected message during a review of a session. Quit stops the program, closes the window and leaves you at the OS-9 prompt where you started.

The items on the Edit menu use a clipboard, either a temporary file or a data module, to transfer selected data in and out of your program. You should be able to select a series of characters, copy them to your clipboard and paste them into another application or elsewhere in your current application. If you select Copy, a copy of the selected text is put on the clipboard and the original text remains in its present position. If you select Cut, the selected text is placed on the clipboard and is removed from the document. Paste is used to place clipboard data into the document at a selected point. Clear is used to delete selected text from a document without saving a copy on the clipboard.

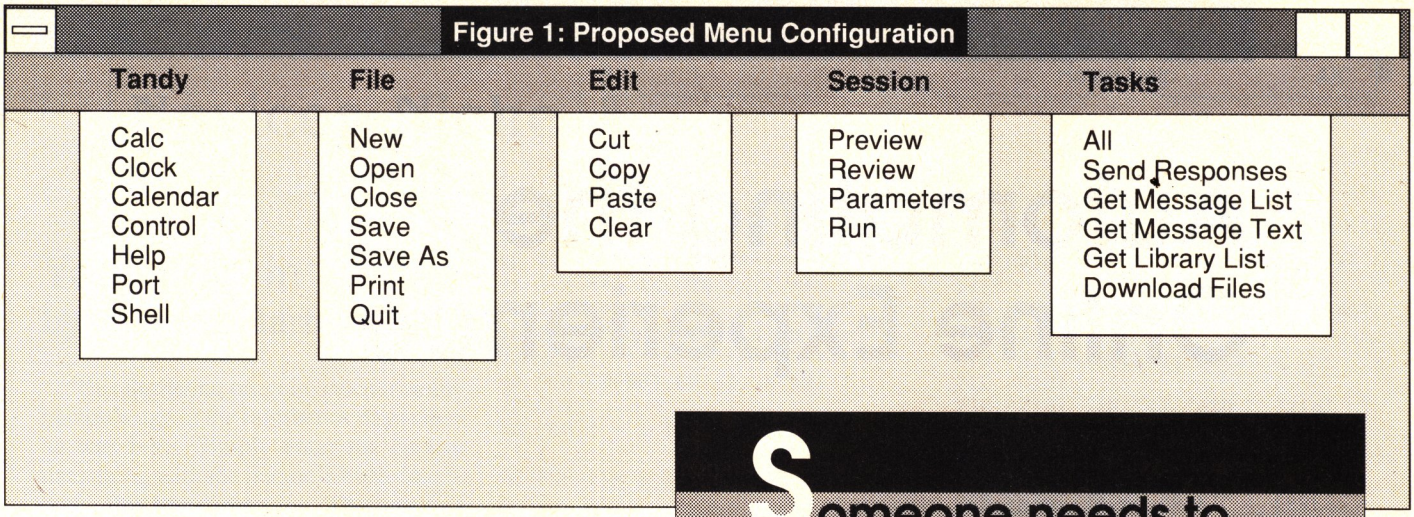
The remaining menus are specific to *AutoDelphi* and are used to tell the program what actions to take while online. From the Session menu, Preview shows what will happen when your computer logs onto Delphi. As your program grows you can add features to let you make changes at this stage.

Most of the time you spend with *AutoDelphi* will involve the Review feature. It is with Review that you read all messages, write replies and select the files you want *AutoDelphi* to download. Parameters is used less frequently. Parameters lets you set up your user ID, password, telephone number and other technical parameters that allow your Color Computer to communicate with your modem. After you've set the parameters, selected the messages you want to read, written your replies and selected files for downloading, select Run from the Session menu. *AutoDelphi* calls Delphi, logs on and follows your instructions.

The subroutines called from the Tasks menu should be fairly easy to write. Each

---

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, KOHYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.



menu item is used to set one or more Boolean variables that tell *AutoDelphi* which actions to perform online. If you select All at the top of the menu, the program will set all the Boolean variables to `TRUE` and perform all actions. On the other hand, if you select only Send Response, the program will not get a list of forum messages, read any messages, list any library directories or download any files.

Remember, if you do not own *MultiVue*, you can substitute text-based menus (like those used in the *Grade Book* program in September) for the mouse-driven menus made possible by the `WindInt` module and the new `gfx2` routines.

Someone needs to create a way to automate the online process in a program that will allow you to do most of your browsing offline.

Researching Delphi

When you begin a project like writing *AutoDelphi*, I suggest you start on a small scale and keep things simple. This allows you to get most of your core code working flawlessly. Once the core is operating properly, additional features can be easily attached to the existing core.

A full-scale *AutoDelphi* would allow you to preselect and enter any forum on Delphi. The program should be able to read the news, get your mail and take care of business in four or five forums, all in one session. To make this project easier, the outline presented here is limited to entering only one forum at a time. Since you can create and maintain many different session files, the program's functionality isn't hampered greatly. Besides, the program is easier to write with this restriction.

Before writing any code, you should thoroughly research Delphi's command set. Essentially, *AutoDelphi* will be issuing commands to the online service just as you did when you logged on manually. While it is running, the program records the session and gives you a chance to review it later. To do this it must know which commands to issue to Delphi and what to expect in return.

When you begin a complex project, you need to determine how much of the work you want to create from scratch. If there are existing tools that perform part of the job, it is advantageous to use them. Little is accomplished by re-inventing the wheel. To get a jump on *AutoDelphi*, consider adding it as an extension to a program such as *WizPro*, a shareware terminal program available from Bill Brady, 1503-I Flanders Lane, Harwood, MD 20776, 301-952-1761. The shareware registration fee is $40. Mind you, you don't need *WizPro* to write *AutoDelphi*. I only suggest it as one alternative to writing the entire program yourself.

If you initiate the program from its inception, you must create and manage the needed windows yourself. You'll need to establish a series of paths to talk to the various windows and external ports. You will also need to define all the fonts, buffers, palettes and menus needed by your program. Writing *AutoDelphi* as an extension to *WizPro* means this work is done for you. Your program is easily installed as a menu selection within *WizPro*.

Registered *WizPro* users receive the source code of a pseudo-procedure named `Type4`. This code provides a complete parameter set. If you use `Type4`, `TYPE` and `PARAM` definitions in your program, *WizPro* will be able to pass the status of its variables to your program when it is run. You can also use these same variables in your own program. With `Type4`, much of the dirty work necessary to construct the special set of data types needed for a communications program has been done. You can let *WizPro*'s AutoLog feature log you onto Delphi. Once online, you can enter the *WizPro* menu key that runs your *AutoDelphi* program and let things rip.

Several variables are accessible to you if *AutoDelphi* is written as an extension of *WizPro*. `Paths`, of the type `wpaths`, has defined paths to the `ACIA` driver, a status window, a small window along the bottom of the screen, a disk file and the printer. There is a field named `Nextproc` that can be used to pass a filename, fields that hold the path to the file holding information unique to the host, the current and last filenames used for downloads, a serial path descriptor, the input path descriptor that was in place when you started *WizPro* and a current path descriptor that can be changed on the fly while your program is running.

Once you have put these `Type4` definitions at the beginning of your program, you can clear the small window at the bottom of the screen by adding the line, `PUT #paths.wpa,cntrl.cls` to your code. Or, you can send a macro to the modem by entering, `PUT #paths.sp,bufs.mac(1)`. Most of the online work for your program involves getting a line of text from Delphi via the modem port and writing it on the

screen and/or in a log file. Command strings must also be sent to Delphi. The three lines below do the trick.

```
GET #paths.sp,bufs.klin
PRINT bufs.klin
PUT #paths.dpa,bufs.klin
```

You will probably want *AutoDelphi* to feed you status reports in a separate window while it runs. When you first log onto Delphi, send the /BUSY command to prevent interference with your automatic session from messages that announce arriving mail and pages from conference users. Assuming that you use *WizPro*'s AutoLog feature to get on Delphi, and that you have previously set up Delphi to go directly to the OS-9 Online SIG, some of the code needed within *AutoDelphi* might look like the pseudo-code shown in Listing 2. Before trying these experiments, you should set your Delphi screen length parameter to 0 (/LENGTH=0) and the prompt mode to brief (/PROMPT=BRIEF). The first setting keeps Delphi from sending you the More? prompt every 24 lines. The second tells Delphi to send a short one line prompt to you each time it needs input. You will no longer need to wait for the long menus to scroll by.

Remember, the code above is a fragment designed to show what needs to be done in a typical automated Delphi session. If your completed program is menu- and mouse-driven, call it by clicking on the Run option on the Session menu.

If you are writing *AutoDelphi* from scratch, you must open paths to all the path variables and dimension all the buffers and other variables. If you plan to use the code above as part of an extension to *WizPro*, check the flag variables to see if the paths are already open. If they're still closed, open them. For example, to see if the path to the status window is open, you need to check the value of the Boolean field, flags.spaopen:

```
IF NOT flags.spaopen THEN
OPEN #paths.spa,win.stat
flags.spaopen:=TRUE
ENDIF
```

After GeneralFlow has been run, you will have a file named DelphiLog stored in the current data directory. The code you write for the Review option would be executed next. It should let you go through the DelphiLog file and mark the message threads you want to read and the files you want to download the next time you run *AutoDelphi*. You will want to include the ability to write a reply to a message.

When you write the final program, store many of the command strings in variables that can be set to different values and repeated. For example, to read a message thread, you will need to send a command of the form, READ THREAD 31096 NS to Delphi. Since you may mark any number of message threads to read when you review your DelphiLog file, you'll need a variable in the place of the 31096 in the above command string. Your new program line might look something like:

```
PRINT #paths.sp,"READ THREAD "; Threa
dnum; " NS"
```

A project of this magnitude goes far beyond the scope of a three-page magazine article, but I wanted you to consider an exciting undertaking that could result in increased excitement in the CoCo community. BASIC09 makes the job more enjoyable since it allows you to write and perfect one module at a time until you have a finished product. In the meantime each individual module will be usable on its own. Go ahead, give it a try! Tell me about

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your progress. If you're a distributor and think the idea has potential, get in touch with me on Delphi and I'll work with you.

StG's Login Package

Along the line of communications, Scott T. Griepentrog of StG Computers, Inc. has been working on an interesting project. If you are fortunate enough to live in a metropolitan area where a number of OS-9 users are within a local telephone call of each other, you might want to gather and consider Griepentrog's *Login Package*.

Griepentrog's *Login Package* is a program you can use to network a number of OS-9 users together. It has built-in facilities to handle news and private mail. You can also use it to chat with another user who has logged on to your Color Computer. If the SysOp gives you permission, you can also log into a Shell and run programs on another user's computer. Scott can be contacted at Box 24285, Speedway, IN 46224 or by phone at 317-241-6401 for more information. You can also talk to Scott's computer if you call 317-244-3159. His is an interesting and useful package.

While on the subject of communications, J. Frank Fields, an avid OS-9/Unix hacker and amateur radio operator (KB0QJ) recently sent me a note via SMTP over the amateur radio TCP/IP network. He forwarded a message that had originated on a CoCo Packet Radio BBS in Arkansas. If you're on the air and looking for a packet BBS, send a note to WJ5V@WJ5V.AR.USA.NA (COCO BBS) Batesville, AR Z:72501. Let me know how you're using your CoCo on packet radio. Send a note to K0HYD@WF0A.#SKS.KS.USA.NA Wichita, KS Z:67216. WF0A will automatically forward it to me via SMTP.

Hope your creative juices were awakened this month. Until December, keep on hacking! ❑

OS-9 Level II

Listing 1:

```
PROCEDURE MenuSetup
 0000       (* Set aside memory for menu *)
 001F       DIM DelWin(6):STRING
 002B       DIM TanMen(7):STRING
 0037       DIM FilMen(7):STRING
 0043       DIM EdMen(4):STRING
 004F       DIM SessMen(4):STRING
 005B       DIM TaskMen(6):STRING
 0067
 0068       (* Display the Menu Bar *)
 0082       RUN gfx2("Title",DelWin,"AutoDelphi",80,24,5)
 00AA
 00AB       (* Set up Session Menu *)
 00C4      RUN gfx2("Menu",DelWin,4,"Session",MN_Sess,10,8,SessMen,Enable)
 00F7       RUN gfx2("Item",SessMen,1,"Preview",Enable)
 011A       RUN gfx2("Item",SessMen,2,"Review",Enable)
 013C       RUN gfx2("Item",SessMen,3,"Parameters",Enable)
 0162       RUN gfx2("Item",SessMen,4,"Run",Enable)
 0181
 0182       (* Set up window and display menus *)
```

Listing 2:

```
PROCEDURE GeneralFlow
 0000       OPEN #paths.dpa,"DelphiLog":UPDATE \(* Open file for Delphi Log *)
 0036       PUT #paths.spa,cntrl.cls \(* Clear Status window *)
 0061       PRINT #paths.spa,"Tell others we're BUSY!";  \(* Report action to user *)
 00A1       PRINT #paths.sp,"/BUSY" \(* Send command to Delphi *)
 00CF       REPEAT
 00D1         READ #paths.sp,bufs.klin \(* Get input from Delphi *)
 00FE       UNTIL SUBSTR("OS9>",bufs.klin)<>0
 0113       PUT #paths.spa,cntrl.cls
 0125       PRINT #paths.spa,"Getting Mail";
 013F       PRINT #paths.sp,"MAIL" \(* Issue Command to Delphi *)
 016D       REPEAT
 016F         READ #paths.sp,bufs.klin \(* Get line of input from Delphi *)
 01A4       UNTIL SUBSTR("MAIL>",bufs.klin)<>0
 01BA       PRINT #paths.sp,"EXTRACT /ALL TT" \(* Read all the mail *)
 01ED       REPEAT
 01EF         READ #paths.sp,bufs.klin \(* Get a line *)
 0211         PRINT bufs.klin \(* Display it on screen *)
 0233         PRINT #paths.dpa,bufs.klin \(* And put it in Log File *)
 0260       UNTIL SUBSTR("MAIL>",bufs.klin)<>0
 0276       PRINT #paths.sp,"EXIT"
 0287       REPEAT
 0289         READ #paths.sp,bufs.klin
 029B       UNTIL SUBSTR("OS9>",bufs.klin)<>0
 02B0       PUT #paths.spa,cntrl.cls \(* Clear Status window *)
 02DB       PRINT #paths.spa,"Checking Graphics Data Library";
 0307       PRINT #paths.sp,"DATABASE" \(* Issue Command to Delphi *)
 0339       REPEAT
 033B         READ #paths.sp,bufs.klin
 034D       UNTIL SUBSTR("TOPIC>",bufs.klin)<>0
 0364       PRINT #paths.sp,"GRAPHICS" \(* Send Command *)
 038B       REPEAT
 038D         READ #paths.sp,bufs.klin
 039F       UNTIL SUBSTR("DBASES:Gra>",bufs.klin)<>0
```

```
03BB        PRINT #paths.sp,"DIR NS" \(* Send Command to Delphi *)
03EA        REPEAT
03EC          READ #paths.sp,bufs.klin \(* Get line *)
040C          PRINT bufs.klin \(* Display *)
0421          PRINT #paths.dpa,bufs.klin \(* Save in Log File *)
0448        UNTIL SUBSTR("DBASES:Gra>",bufs.klin)<>0
0464        PRINT #paths.sp,"EXIT"
0475        REPEAT
0477          READ #paths.sp,bufs.klin
0489        UNTIL SUBSTR("OS9>",bufs.klin)<>0
049E        PUT #paths.spa,cntrl.cls \(* Clear Status window *)
04C9        PRINT #paths.spa,"Reading Our Messages!";
04EC        PRINT #paths.sp,"FORUM" \(* Command to Delphi *)
0515        REPEAT
0517          READ #paths.sp,bufs.klin
0529        UNTIL SUBSTR("FORUM>",bufs.klin)<>0
0540        PRINT #paths.sp,"READ WAITING NS" \(* Issue Command to Delphi *)
0579        REPEAT
057B          READ #paths.sp,bufs.klin
058D          PRINT bufs.klin
0595          WRITE #paths.dpa,bufs.klin
05A6        UNTIL SUBSTR("FORUM>",bufs.klin)<>0
05BD        PUT #paths.spa,cntrl.cls \(* Clear Status window *)
05E8        PRINT #paths.spa,"Getting List of New Messages!";
0613        PRINT #paths.sp,"DIR NEW NS" \(* Issue Command to Delphi *)
0647        REPEAT
0649          READ #paths.sp,bufs.klin
065B          PRINT bufs.klin
0663          PRINT #paths.dpa,bufs.klin
0674        UNTIL SUBSTR("FORUM>",bufs.klin)<>0
068B        PUT #paths.spa,cntrl.cls \(* Clear Status window *)
06B6        PRINT #paths.spa,"Signing Off Delphi!";
06D7        PRINT #paths.sp,"BYE" \(* Issue Command to Delphi *)
0704        CLOSE #paths.dpa \(* Close path to Delphi Log *)
```


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The Assembly Line

Part VI: The Turing Bus

by William P. Nee

All aboard the Turing bus! This bus is named for Alan M. Turing, a British mathematician believed by many to be the founder of modern computer principles. Alan Turing imagined a machine that could read a strip of paper containing zeros and ones and then react to that information — much as present-day computers operate using binary numbers. As his imagined machine read each number, it might change that number, change to another "state," and move left or right according to the current state instructions. A typical state instruction might read "If you are reading a 0, change it to a 1, change to State 2 and move left; if you are reading a 1, change to State 3 and move to the right." The instructions for State 3 might be as simple as *stop*. This simple set of instructions is the forerunner of what we now call ROM routines.

Turing believed that any mathematical operation — addition, multiplication, etc. — could be carried out using this concept with sufficient instructions. A simple program to add two numbers and stop can be written using three sets of instructions. Now let's transfer this idea to the CoCo, using color to represent the different states or values.

An imaginary machine comes to life

Moving in the Right Direction

Instead of moving just left and right — not a very interesting display — we'll move in relation to the previous direction. If you move one square to the right, then move right again, you'll have moved one square to the south. Four moves to the right take you back to the original location. We'll define north as Direction 0, right as Direction 1, south as Direction 2, and left as Direction 3. Now you can add the new direction value to the old direction value to determine which way to move.

Going to the right is Direction 1; turning right again is 1+1 or Direction 2, which is actually moving south. Going left and then turning south is 3+2 or Direction 5. There is no Direction 5, since we only have directions 0 through 3. Therefore, AND the result with 3 to keep it within this range. Now `(3+2)AND3` is Direction 1 or right.

Moving means to increase or decrease the current *x* and *y* locations by one, according to the direction. The general rules are:

	New *x*	New *y*
North	*x*=*x*	*y*=*y*-1
Right	*x*=*x*+1	*y*=*y*
South	*x*=*x*	*y*=*y*+1
Left	*x*=*x*-1	*y*=*y*

You may also decide to move diagonally. Each new location would then be plus or minus one, depending on the direction. I find it easy to put the direction changes in data format and read each change as d*x*(0), d*y*(0), d*x*(1), d*y*(1), etc. This way if I want to move in Direction 3, I can add d*x*(3) and d*y*(3) to *x* and *y*. The DATA statement for the general rules is:

```
DATA 0,-1,+1,0,0,+1,-1,0
```

For diagonal moves the data is:

```
DATA +1,+1,+1,-1,-1,-1,-1,+1
```

Now for an example. Listing 1 is a BASIC program for a two-state Turing bus. Its rules are as follows:

State 1: If you read a 0, change it to 1, stay

Bill Nee bucked the snowbird trend by retiring to Wisconsin from a banking career in Florida. The success of his 13-part series, "Machine Language Made BASIC" (July 1988 to July 1989), prompted him to continue writing articles on Color Computer machine-language programming.

in State 1 and move left; if you read a 1, change it to 0, change to State 2 and move north.

State 2: If you read a 0, change it to 1, change to State 1 and move right; if you read a 1, don't change the value but change to State 1 and move right.

States or values are read with the PPOINT command. Since a point set in PMODE 4 has a value of 5 (by virtue of its color), I change all 1s to 5s in the two-state rules. Directions are read from the DATA statements, and the center of the screen is the first point checked. When you run the program you'll see that it slowly spirals around itself as it gets bigger. Any coordinate that would be off the screen is wrapped to the opposite side of the screen.

The program starts with State 0, but that can be changed in Line 20; you can PSET or PRESET the starting point before you get its value. What effect does that have? Using the data in Line 180 forces diagonal moves instead of north, south, right and left. Try experimenting with the rules and see which ones create patterns that will keep going. For example, change the D+0 in Line 70 to D+1. Most changes produce either very simple patterns or ones that don't appear to go anywhere. Evidently our bus driver is very sensitive to the rules of the road.

A Bus of a Different Color

Now let's try a program in color using machine language (Listing 3). Since it's quicker to look up a value than to use the PPOINT command, we'll use an array 128-by-192 bytes in size. Even though the program starts low in memory, there isn't that much storage room available. Therefore we'll go as far as we can in low RAM, then switch to high RAM. I only need to clear the high RAM location once, though, in Line 190. From then on, anything over $7FFF automatically goes to high RAM.

Lines 200 through 240 set everything in the array to 0. Lines 250 through 260 establish the initial direction as 0, but you can change this in the BASIC driver (Listing 2) for the program. Likewise lines 280 through 290 set the starting coordinates that can also be changed. The LOOP routine determines the value for those coordinates and changes direction accordingly. The rule for this trip says *if the value is less than two, increase the direction by one. Otherwise decrease the direction by one. Always increase the value by one.*

The PSET routine keeps the color within the 0 to 3 range and sets the corresponding coordinates. The WRAP routine computes the new coordinates, depending on the value of TYPE, and wraps them around the screen if necessary. Then the whole routine branches back to LOOP to get a new location and value. Apparently our bus driver will never run out of gas. The only way to stop the program is to push the Reset button; this will also automatically take you out of high RAM. After entering the assembly-language program, check it for errors with A/NO/NS/WE; then save the assembly source code by entering W TURING.ASM and assemble it.

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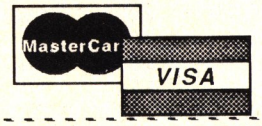
Bare 512K booster kit (Same as DELUXE, but no memory chips)	$29.95

CyberVoice speaks well for OS9!

We've mated a high-tech SC-02 speech synthesizer with an entirely new kind of OS9 device driver that actually lets you specify your own pronunciation rules. You can even control the style and pitch of the voice - male, female, high, low, fast, slow - billions of combinations. Advanced features like instantaneous inflection control produce near human-quality speech! CyberVoice is compatible with the Speech Systems SuperVoice - buy H/W & S/W, or just the CyberVoice software.



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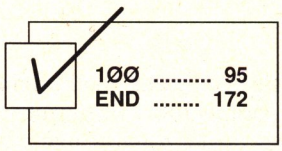
The BASIC driver allows you several options. You can:

- change the initial direction (Line 40).
- start anywhere (Line 50).
- pick normal or diagonal movement (Line 80 or Line 130).
- allow for more than three states (Line 70).
- compare to values other than 2 (Line 60).

The values in Line 70 must be powers of 2 minus 1 (3, 7, 15, etc.); the comparison number in Line 60 can be any value up to this number. Since the value could be greater than the number of colors, that extra ANDB #3 in the machine-language program keeps the color range within 0 to 3. Save the BASIC program as TURING2.BAS.

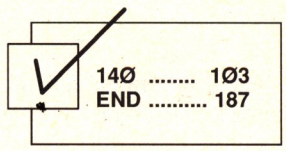
As a graphics bonus, Listing 4 is another machine-language program that drives four buses, each going in its own direction. Assemble it with A 4CTURING.BIN. It can also be run from Listing 2 by changing LOADM "TURING" in Line 30 to LOADM "4CTURING" instead. I've included a chart with some interesting settings using the 4CTURING program. Next month we'll see what's cooking with "Julia's Child" or "Mount Mandelbrot Revisited." Meanwhile, if you have any suggestions for articles, let me know — they're a big help. ❑

64K Disk



Listing 1: TURING1

```
Ø 'COPYRIGHT 1990 FALSOFT, INC.
1Ø FOR N=Ø TO 3:READ DX(N),DY(N)
:NEXT
2Ø ST=Ø:X=128:Y=96
3Ø PMODE4,1:PCLS:SCREEN1,1
4Ø C=PPOINT(X,Y)
5Ø IF C=Ø AND ST=Ø THEN C=5:D=(D
+3)AND 3:ST=Ø:GOTO 9Ø
6Ø IF C=Ø AND ST=1 THEN C=5:D=(D
+1)AND 3:ST=Ø:GOTO 9Ø
7Ø IF C=5 AND ST=Ø THEN C=Ø:D=(D
+Ø)AND 3:ST=1:GOTO 9Ø
8Ø IF C=5 AND ST=1 THEN C=5:D=(D
+1)AND 3:ST=Ø
9Ø PSET(X,Y,C)
1ØØ X=X+DX(D)
11Ø IF X>255 THEN X=Ø
12Ø IF X<Ø THEN X=255
13Ø Y=Y+DY(D)
14Ø IF Y>191 THEN Y=Ø
15Ø IF Y<Ø THEN Y=191
16Ø GOTO 4Ø
17Ø DATA Ø,1,1,Ø,Ø,-1,-1,Ø
18Ø 'DATA 1,1,1,-1,-1,-1,-1,1
```



Listing 2: TURING2

```
Ø 'COPYRIGHT 1990 FALSOFT, INC.
1Ø CLEAR2ØØ,&H3ØØØ-1
2Ø TY=&H3ØØ3:DI=&H31ØF:LO=&H3Ø28
3Ø IF PEEK(&H3ØØB)<>26 THEN LOAD
M"TURING":POKE&HFF4Ø,Ø
4Ø POKE DI,Ø
5Ø POKE LO,51:POKE LO+1,96
6Ø POKE &H3Ø4Ø,2
7Ø POKE &H3Ø5Ø,3
8Ø POKE TY+Ø,Ø:POKE TY+1,255
9Ø POKE TY+2,1:POKE TY+3,Ø
1ØØ POKE TY+4,Ø:POKE TY+5,1
11Ø POKE TY+6,255:POKE TY+7,Ø
12Ø GOTO 17Ø
13Ø POKE TY+Ø,1:POKE TY+1,1
14Ø POKE TY+2,1:POKE TY+3,255
15Ø POKE TY+4,255:POKE TY+5,255
16Ø POKE TY+6,255:POKE TY+7,1
17Ø PMODE3,1:PCLS:SCREEN1,1
18Ø 'PMODE4,1:COLORØ,5:PCLS:SCRE
EN1,1
19Ø EXEC &H3ØØB
```

Listing 3: TURING

```
00100          ORG     $3000
00110 ACROSS   RMB     1
00120 DOWN     RMB     1
00130 DIR      RMB     1
00140 TYPE     FDB     $0001
00150          FDB     $0100
00160          FDB     $00FF
00170          FDB     $FF00
00180 START    ORCC    #$50
00190          CLR     $FFDF
00200          LDU     #ARRAY
00210          LDD     #0
00220 ALOOP    STD     ,U++
00230          CMPU    #ARRAY+128*192
00240          BLO     ALOOP
00250          LDB     #0
00260          STB     DIR
00270          LDY     #TYPE
00280          LDD     #$3360
00290          STD     ACROSS
00300
00310 LOOP     LDA     #128
00320          MUL
00330          ADDB    ACROSS
00340          ADCA    #0
00350          LDU     #ARRAY
00360          LEAU    D,U
00370          LDB     ,U
00380          LDA     DIR
00390          CMPB    #2
00400          BHS     OTHER
00410
00420          INCA
00430          ANDA    #3
00440          BRA     CONT
00450
00460 OTHER    DECA
00470          ANDA    #3
00480
00490 CONT     STA     DIR
00500 PSET     INCB
00510          ANDB    #3
00520          STB     ,U
00530          ANDB    #3
00540          LDA     #$55
00550          MUL
00560          STB     $B5
00570          LDA     DOWN
00580          LDB     $B9
00590          MUL
00600          ADDA    $BA
00610          TFR     D,X
00620          LDB     ACROSS
00630          LSRB
00640          LSRB
00650          ABX
00660          LDA     ACROSS
00670          ANDA    #3
00680          LDU     #TABLE
00690          LDA     A,U
00700          TFR     A,B
00710          COMA
00720          ANDA    ,X
00730          ANDB    $B5
00740          PSHS    B
00750          ORA     ,S+
00760          STA     ,X
00770
00780 WRAP     LDB     DIR
00790          LSLB
00800          LDD     B,Y
00810          ADDA    ACROSS
00820          ANDA    #$7F
00830          ADDB    DOWN
00840          CMPB    #192
00850          BNE     DOWN1
00860          CLRB
00870          BRA     DOWN2
00880 DOWN1    CMPB    #$FF
00890          BNE     DOWN2
00900          LDB     #191
00910 DOWN2    STD     ACROSS
00920          LBRA    LOOP
00930
00940 TABLE    FDB     $C030
00950          FDB     $0C03
00960
00970 ARRAY    RMB     1
00980          END     START
```

Listing 4: 4CTURING

```
00100          ORG     $3000
00110 ACROSS   RMB     1
00120 DOWN     RMB     1
00130 DIR      RMB     1
00140 TYPE     FDB     $0001
00150          FDB     $0100
00160          FDB     $00FF
00170          FDB     $FF00
```

```
00180 START   ORCC    #$50
00190         CLR     $FFDF
00200         LDU     #ARRAY
00210         LDD     #0
00220 ALOOP   STD     ,U++
00230         CMPU    #ARRAY+128*192
00240         BLO     ALOOP
00250         LDB     #0
00260         STB     DIR
00270
00280         LDY     #TYPE
00290         LDD     #$2A40
00300         STD     ACROS1
00310
00320 LOOP    LDA     #128
00330         MUL
00340         ADDB    ACROS1
00350         ADCA    #0
00360         LDU     #ARRAY
00370         LEAU    D,U
00380         LDB     ,U
00390         LDA     DIR
00400         CMPB    #2
00410         BHS     OTHER
00420
00430         INCA
00440         ANDA    #3
00450         BRA     CONT
00460
00470 OTHER   DECA
00480         ANDA    #3
00490
00500 CONT    STA     DIR
00510 PSET    INCB
00520         ANDB    #3
00530         STB     ,U
00540         ANDB    #3
00550         LDA     #$55
00560         MUL
00570         STB     $B5
00580         LDD     ACROS1
00590         BSR     PSET1
00600
00610         LDA     #127
00620         SUBA    ACROS1
00630         LDB     DOWN1
00640         BSR     PSET1
00650
00660         LDA     #127
00670         SUBA    ACROS1
00680         LDB     #191
00690         SUBB    DOWN1
00700         BSR     PSET1
00710
00720         LDA     ACROS1
00730         LDB     #191
00740         SUBB    DOWN1
00750         BSR     PSET1
00760         BRA     WRAP
00770 PSET1   STD     ACROSS
00780         LDA     #32
00790         MUL
00800         ADDA    $BA
00810         TFR     D,X
00820         LDB     ACROSS
00830         LSRB
00840         LSRB
00850         ABX
00860         LDA     ACROSS
00870         ANDA    #3
00880         LDU     #TABLE
00890         LDA     A,U
00900         TFR     A,B
00910         COMA
00920         ANDA    ,X
00930         ANDB    $B5
00940         PSHS    B
00950         ORA     ,S+
00960         STA     ,X
00970         RTS
00980
00990 WRAP    LDB     DIR
01000         LSLB
01010         LDD     B,Y
01020         ADDA    ACROS1
01030         ANDA    #$7F
01040         ADDB    DOWN1
01050         CMPB    #192
01060         BNE     CD1
01070         CLRB
01080         BRA     CD1A
01090 CD1     CMPB    #$FF
01100         BNE     CD1A
01110         LDB     #191
01120 CD1A    STD     ACROS1
01130         LBRA    LOOP
01140
01150 ACROS1  RMB     1
01160 DOWN1   RMB     1
01170
01180 TABLE   FDB     $C030
01190         FDB     $0C03
01200
01210 ARRAY   RMB     1
01220         END     START
```


Hyper-Tech Software

MVCanvas 2.0

Finally a professional full screen editor for OS-9 Level II and Multi-Vue. MVCanvas is the only CoCo graphics editor to support multiple resolutions with up to 16 colors of 64 displayed in 320 x 200 mode with palette animation and full functional clipboard.

MVCanvas also supports multiple fonts with inverse, bold underline, and proportional options. Printer support includes: Epson, Star, C.Itoh, DMP (Tandy), with color printer supported for Star NX-1000 R, Citizen GSX-140, Tandy DMP-240 amd CGP-200, Epson LQ-2550 and compatables.

ShellMate 2.2

ShellMate is the epitome of what a point and click file management system was meant to be. With ShellMate, you have access to commands such as copy, move, delete, rename, makdir and free at the touch of a button. It also gives you point and click access to the Public Domain picture display utilities VEFShow and GIFOS9, as well as the archive utility Ar.

The biggest benefit of ShellMate is that it allows you to manipulate large batches of files with one mouse click when either copying, moving, deleting or arcing. You can also easily move through simultaneously displayed Source and Destination directory trees by either double clicking on a subdirectory name, or clicking on the "Parent" command.

System Requirements (both programs)
CoCo3, OS-9 LVL II, Multi-Vue, Disk Drive and 512k
MVCanvas $49.95
ShellMate $24.95
$3.00 S/H $2.50 C.O.D (U.S. only) Nev. res. add 6% sales tax

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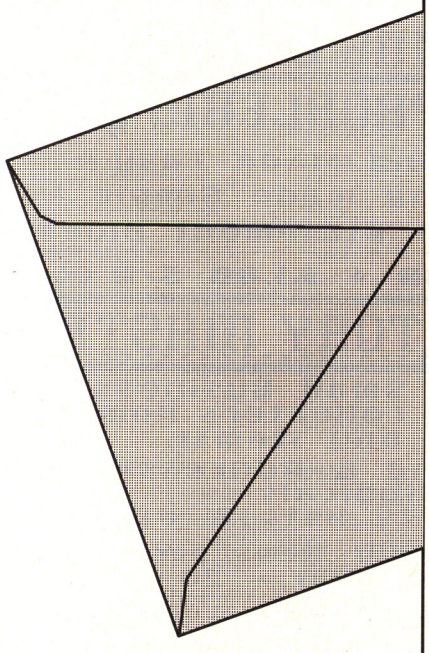


Novices Niche

Graphics 16K Extended

Adding Machine
by Ernie Thompson

Adding Machine is designed to operate like a tape-printing adding machine. It sends running totals to both the printer and screen. In the interest of dispelling clutter, the screen display of both number and running total is only momentary. This could have been a free-standing one-liner, but I thought the program might be handy if it printed headings for various types of additions. So in the beginning you are prompted for a title to your addition. After you have entered the number of the desired heading, the printer draws a heavy checkered line under the latest total, the print head advances two spaces, the title is printed, a line is drawn under it, the header advances two more spaces vertically, and you are prompted on the screen for a number so the printing can begin.

When you have entered all the addends for your calculation, you get a final total on paper. To begin anew, press BREAK, type and enter RUN, and enter a heading number. The option is always open to use Line 100 as a free-standing one-liner by simply eliminating the other program lines.

To subtract a number, type a minus sign (-) before the number to be entered. For different headings than those shown, the new title needs to be substituted in two places in the program: once in the menu line and again in a line where the headline is printed. With ordinary care this is easy to do. The new program version then needs to be saved (preferably under another name in case the original version is required for reference purposes).

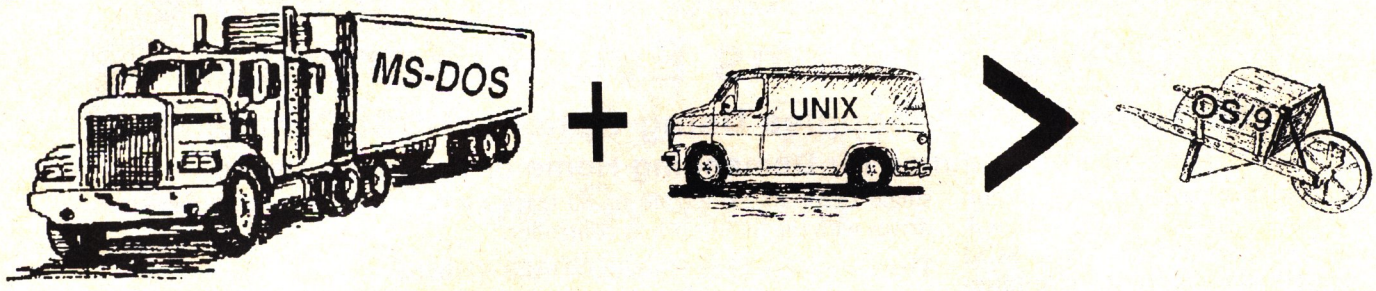
The Listing: ADD

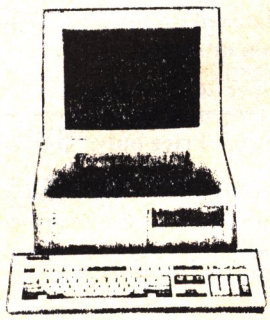
```
0 ' COPYRIGHT 1990  FALSOFT, INC
10 'ADDING MACHINE
20 CLS:PRINT"CHOOSE YOUR HEADING
"
30 PRINT"NO.1 TOTAL EARNINGS"
40 PRINT"NO.2 TOTAL INTEREST"
50 PRINT"NO.3 TOTAL INCOME"
60 PRINT"NO.4 TOTAL DEDUCTIONS"
70 PRINT"NO.5 TAXABLE INCOME"
80 PRINT"NO.6 CHECKS OUTSTNDG":I
NPUT R
90 ON R GOTO 110,130,150,170,190
,210
100 CLS:INPUT"NUMBER";N:PRINT#-2
,"$";N"<===ADD ON":N1=N:N2=N2+N:
PRINT@78,"$"N2"**TOTAL**":PRINT#
-2,"$";N2"==>**TOTAL**":FORX=1TO
300:NEXTX:GOTO100
110 PRINT#-2,STRING$(20,229):PRI
NT#-2,""
120 PRINT#-2,"TOTAL EARNINGS":PR
INT#-2,STRING$(14,241):PRINT#-2,
"":GOTO100
130 PRINT#-2,STRING$(20,229):PRI
NT#-2,""
140 CLS:PRINT#-2,"TOTAL INTEREST
":PRINT#-2,STRING$(14,241):PRINT
#-2,"":GOTO100
150 PRINT#-2,STRING$(20,229):PRI
NT#-2,""
160 PRINT#-2,"TOTAL INCOME":PRIN
T#-2,STRING$(14,241):PRINT#-2,""
:GOTO100
170 PRINT#-2,STRING$(20,229):PRI
NT#-2,""
180 CLS:PRINT#-2,"TOTAL DEDUCTIO
NS":PRINT#-2,STRING$(14,241):PRI
NT#-2,"":GOTO100
190 PRINT#-2,STRING$(20,229):PRI
NT#-2,""
200 PRINT#-2,"TAXABLE INCOME":PR
INT#-2,STRING$(14,241):PRINT#-2,
"":GOTO100
210 PRINT#-2,STRING$(20,229):PRI
NT#-2,""
220 PRINT#-2,"CHECKS OUTSTANDING
":PRINT#-2,STRING$(14,241):PRINT
#-2,"":GOTO 100
```

Would You Buy a Car You Couldn't Get Fuel For?

Why Buy a Computer You Can't Get Software For?

Many of you are now considering an alternative to the Color Computer to run OS/9. Are you really going to invest in an untried alternative with very limited software? Why not buy a computer that will run a UNIX Compatible (OS/9 like) operating system AND MS-DOS. According to published articles, this combination of industry-standard operating systems would run more than 90% of ALL of the software that has EVER been written. Compare the software bases represented below. We call these systems the OWL ATom.™ Can your alternative to the CoCo be fixed locally? On-site service is available most areas on the ATom.





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Hard Drive Interface	Yes(16 Bit)	Yes(16 Bit)	Yes(8 Bit)
Floppy Drive	1.2 or 1.44 Meg	1.44 Meg	720K
Power Supply (Watts)	200	70	67
Warranty (Parts and Labor)	1 Year	90 Days	90 Days

* Trademarks as follows: Model numbers -Tandy Corporation, MS-DOS- Microsoft, Inc., OS/9 -MicroWare, Inc., UNIX- AT&T, Inc.

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- **No-Halt Floppies with optional SCSI controller allows full type-ahead during access**
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*SCSI controller is OMTI 5100. Add $75 for OMTI 5200 with FDC.

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20/30 Meg	ST/PTI	$229.
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(Note: We have no drivers for tape yet)

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Case, 45 Watt PS, Fan	$105.
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Drives have a 1-year limited warranty. Other parts are 90-day warranty. Please Note - At these prices, only very limited support can be given.

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CoCos and Laser Jets

by William Barden, Jr.
Contributing Editor

When I want to plot something on the CoCo, whether it's for designing a type face, logo, or simple figure, I run into trouble. The "worksheets" in the back of the Color Computer Extended BASIC manual just don't cut it. They pack a 320-by-192 matrix into a small page, which makes it nearly impossible to count pixels from the worksheets. Also, there's no 640-by-192 worksheet for the CoCo 3 high-resolution graphics mode. Going to graph paper doesn't help, either. The best paper I could find without going to a specialized graphics-art store was 10 squares-per-inch. To represent the entire CoCo 3 screen in high-resolution mode would require a pieced together worksheet of 64 inches by 19 inches. Another problem with the graph paper is the proportion of the cells represented. The pixels found in almost all graphics modes are not square, but rectangular. These pixels require a precise worksheet to ensure proper proportions on the screen. A partial answer to CoCo graphics worksheets is in this column, if you are willing to suffer through some explanations of graphics and laser printer technology.

CoCo 3 Hi-Res Graphics Modes

I love my CoCo 3. The high-resolution graphics modes compare very well to the CGA modes of MS-DOS systems. There are also more colors than in typical MS-DOS systems, except the Tandy 1000s. There are two high-resolution densities, 320-by-192 and 640-by-192. The first number represents the number of pixels across the screen, either 320 or 640. The second figure represents the number of pixels from top to bottom on the screen.

The CoCo 3 high-resolution graphics modes compare very well to the CGA modes of MS-DOS systems.

The *aspect ratio* of a screen is the proportion of the width to height. A television picture has an aspect ratio of 4:3. That is, four units wide by three units high, or 1.333. This television aspect ratio has been established as a standard that is both pleasing to the eye and easy to implement, but it isn't God-given. The new high definition television aspect ratio that everyone's talking about is wider and more like a movie screen. A typical CM-8 color monitor high-resolution screen measures 9.7 inches wide by 6.3 inches high with an aspect ratio of about 1.54, within working range of the 1.333 aspect ratio.

A "perfect" computer graphics screen would show square pixels of 640 across by 480 vertically and preserve the 4:3 aspect ratio of most televisions or monitors (640/480=4/3). Square pixels would make life easier for computer graphics worksheets. Some 10-square-per-inch graph paper from your local drug store is all that would be needed. (MS-DOS VGA graphics does indeed use this ratio.) The CoCo 3 640-by-192 screen is not hard to fit into the magic 4:3 ratio. Simply multiply 192 by 2.5. You get exactly 480. This means that a CoCo 3 640-by-192 Hi-Res pixel is exactly one unit wide by 2.5 units high, as shown in Figure 1.

Since the 320-by-192 high-resolution pixel is twice the width, the proportions become 2:2.5, or one unit wide by 1.125 units high, as shown in the same figure.

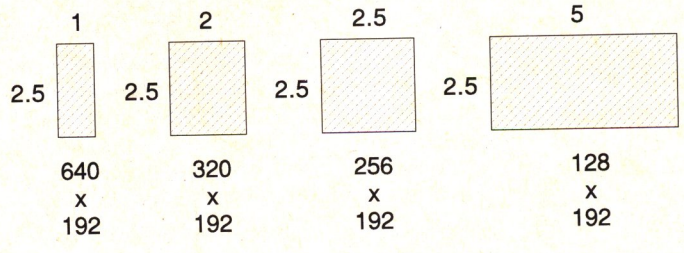

Figure 1: Aspect Ratios

Bill Barden has written 35 books and hundreds of magazine articles about small computers . His newest Color Computer project, Connecting the CoCo to the Real World, *is a book of CoCo interfacing projects. He has over 20 years experience in the industry on systems ranging from mainframes to micros.*

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Sample Calligrapher CliPix Pictures

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Calligrapher CliPix - The Calligrapher may now include graphics pictures along with the text it prints. There are currently 9 different CliPix disks available, each one has over 60 different graphic pictures. While the OS9/MS-DOS Calligrapher may easily combine both text and CliPix, the RS-DOS (CoCo) Calligrapher may also print out the CliPix. **$9.95** each.

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Low-Resolution Graphics Modes

The most popular low-resolution graphics modes are the ones with 128-by-192 pixels and 256-by-192 pixels. These are not HSCREEN modes and the screen proportions change slightly. On my CM-8 color monitor, the actual physical screen dimensions are 7.7 inches wide by 6.2 inches high, which is an aspect ratio of 1.24. Again, this is within the working range of the magic 1.333 television ratio. An interesting fact about the 256-by-192 screen is that 256:192 is exactly 4:3 — the pixels in this mode are exactly square, with a width of one unit and a height of one unit, as shown in Figure 1.

Pixels in the 128-by-192 mode are two units wide by one unit high, since the width is stretched out to twice the distance.

A Useful Worksheet

It seems to me that graphics worksheets that try to represent the entire screen are not really usable. They either cram all the pixels together or they are huge. A better approach might be to show a reasonable portion of the screen, since you are usually working with a graphics character or figure that uses only a small fraction of the total screen area. I came up with a compromise. Plot a graphics worksheet of 160 pixels horizontally by 48 pixels vertically. This represents one-fourth of the screen distance horizontally or vertically, which is not an unreasonable area to work with (see Figure 2). Several sheets can still be taped together to show larger portions of the screen if necessary.

I can never figure out which pixel a label such as 184 refers to on worksheets in the Extended BASIC manual. There seem to be three in the immediate area, and it's easy to get confused when counting. I opted to add a heavier line every 10 pixels. It is easier to count in groups of 10 and then by units to locate individual pixels. Samples of the 640-by-192 and 320-by-192 worksheets are shown in Figure 3. The 256-by-192 and 128-by-192 worksheets are not shown.

Printing the Worksheets

The big problem for the worksheets is how to print the darn things. Many of you probably have dot-matrix printers like mine that are capable of printing Hi-Res graphics worksheets. There always seem to be problems with these printers. Although you can print Hi-Res graphics, you usually can't get a fine enough resolution for exact proportions. This has been my experience on a variety of Tandy and other dot-matrix printers. The solution is to print the worksheets on a laser printer. The laser printer has the capacity to generate very precise forms. Let me tell you a little bit about laser printers.

Laser Printer Basics

In addition to several dot-matrix printers, I also have a Hewlett-Packard LaserJet Series II printer that I use with my CoCos and MS-DOS systems. One interesting thing about the LaserJet is that it has both serial and parallel ports, which makes it easy to switch between the serial output of the CoCo and the parallel output of my other systems. There are a host of HP LaserJet series-compatible laser printers. For example, the Tandy LP-1000 is LaserJet Plus-compatible, which means that programs set up for the LaserJet Plus series also work on the Tandy LP-1000. There are also some very inexpensive laser printers available which you might consider for your CoCo system. Of course, *very inexpensive* is a relative term. The cost of some of the new and powerful laser printers is in the $900 range, which probably exceeds the complete investment in your CoCo system. Nevertheless, a LaserJet and CoCo makes for a very powerful desktop publishing system.

Laser printers operate by using a laser diode beam with usually a Canon or Ricoh photocopier mechanism. The beam can be precisely controlled and the resolution of the printing is 300 dots-per-inch, about four times as good as the best high-resolution dot-matrix printers. Individual dots are very crisp and clean, unlike those in dot-matrix printing, which tend to smudge.

Laser Printing Commands

Laser printers are controlled by a built-in language called PCL, or Printer Control Language. This is a special language developed by Hewlett-Packard for their printers. PCL is very similar in complexity and functions to the print commands found in Radio Shack printers, but the commands are not the same. Most of the things that can be done with PCL are very primitive. It can position a print head cursor somewhere on the page, change the line feed spacing, change the character spacing, select a new font, change the printing margins, and so forth.

Like Tandy printer commands, laser printer commands in PCL are sent as a string

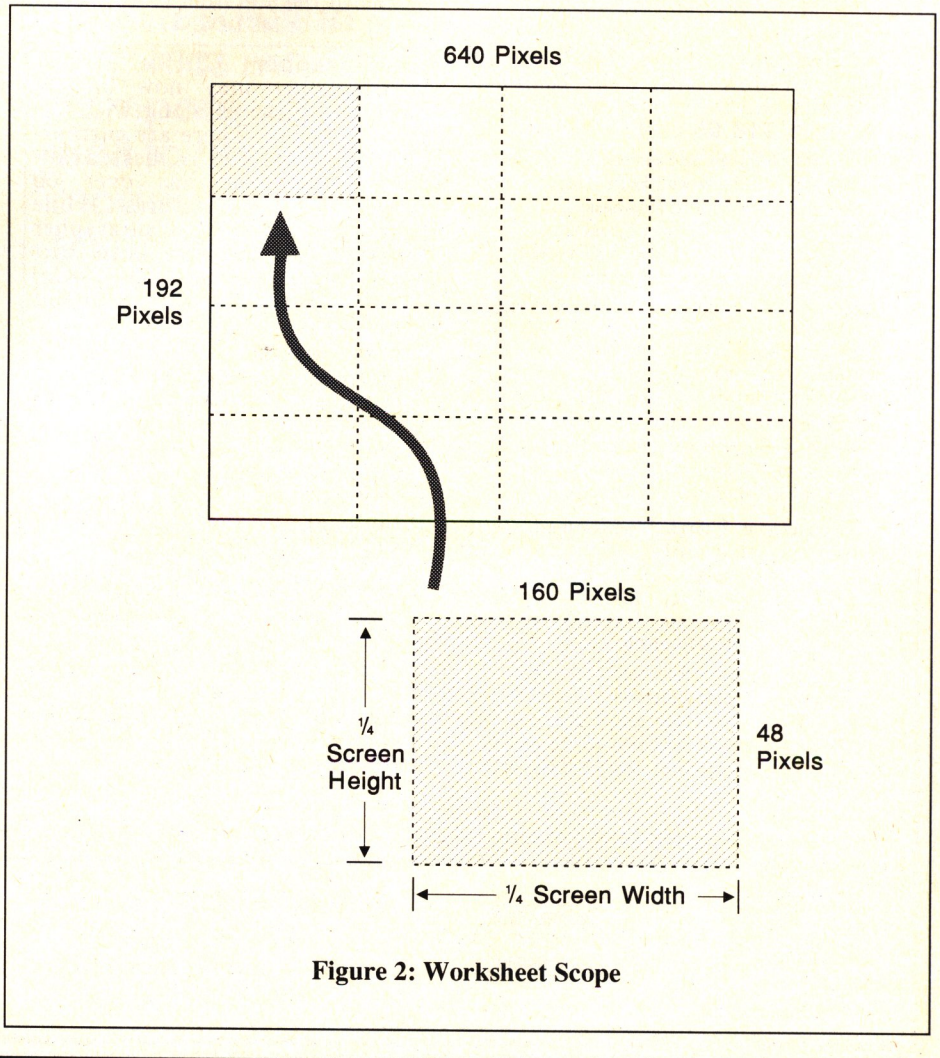

Figure 2: Worksheet Scope

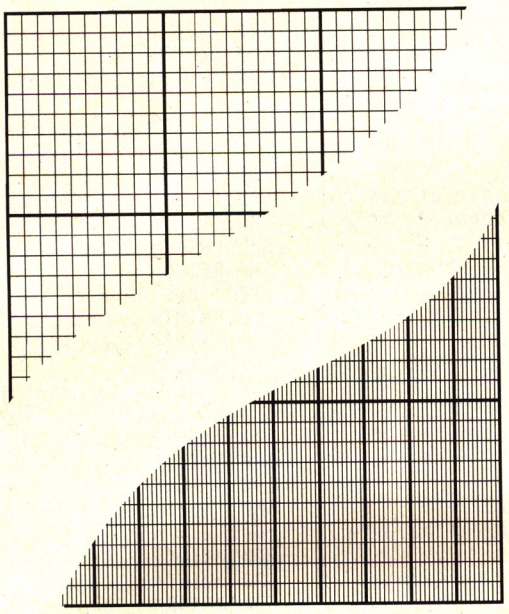

Figure 3: Sample Worksheet Sections

of characters, the first character of which is an escape code (decimal 27). The characters that follow this code define the action to be taken. The necessary command formats needed to print a worksheet are shown in Figure 4.

These commands are preceded by an escape character. For example, to change the left margin, you would send `CHR$(27)+"&a13L"` from BASIC. Bear in mind that a laser printer page is like a graphics screen. You can repaint areas of it in any sequence, not just printing from left to right and from top to bottom. This fact makes it very easy to create complex graphics. The rectangle commands require some explanation. The Define Rectangle Width command defines a rectangle of a certain number of dots in width. The Define Rectangle Height command defines the rectangle's height in dots. The Print Rectangle Area command actually prints the rectangle starting at the current print head position. Although you can use different patterns in the rectangle, the default is a solid fill — all black. Both horizontal and vertical lines are created by defining rectangles of different size and printing them. A horizontal line is

`&f0Sc`	save the current print position on the page
`&f1S`	restore the current print position on the page
`*p400X`	position the print head 400 dots (400/300 inches) over from the left margin
`*p2100Y`	position the print head 2100 dots (2100/300 inches) down from the top margin
`E`	print the current page and eject
`&l1O`	set landscape mode (print on the page width)
`9`	reset the margins
`&a13L`	set left margin to the 13th column position
`*c2400A`	define a rectangle width of 2400 dots (2400/300 inches)
`*c3B`	define a rectangle height of 3 dots (3/300 inches)
`*c0P`	print a rectangular area at the current print-head position
`*p+38Y`	move the print head down 38 dots (38/300 inches)
`*p+15X`	move the print head over 15 dots 15/300 inches)

Figure 4: LaserJet Commands for Worksheets

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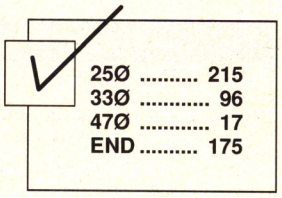
16K Extended



Listing 1: CCGRAPH

```
100 ' CoCo 640 by 192 Graphic La
yout Plotter for LaserJet
130 GOSUB 330
140 GOSUB 360
150 PRINT#-2,CHR$(27)+"&f0S";
160 FOR I=1 TO 5
170 GOSUB 440:GOSUB 560
180 GOSUB 400
190 FOR J=1 TO 9:GOSUB 560:NEXT
J
200 NEXT I
210 GOSUB 440:GOSUB 560
220 PRINT#-2,CHR$(27)+"&f1S";
230 FOR I=1 TO 16
240 GOSUB 520:GOSUB 600
250 GOSUB 480
260 FOR J=1 TO 9:GOSUB 600:NEXT
J
270 NEXT I
280 GOSUB 520:GOSUB 600
290 PRINT#-2,CHR$(27)+"*p400X"+C
HR$(27)+"*p2100Y";
299 REM If your LaserJet has Aut
o CR/LF, remove ;CHR$(10) from l
ine 300
300 PRINT#-2,"Color Computer 3 6
40 by 192 Mode - Grid of 160 Hor
izontal by 50 Vertical Pixels";C
HR$(10)
310 PRINT#-2,CHR$(27)+"E";
320 STOP
330 ' set landscape
340 PRINT#-2,CHR$(27)+"&l1O";
350 RETURN
360 ' set margins
370 PRINT#-2,CHR$(27)+"9";
380 PRINT#-2,CHR$(27)+"&a13L";
390 RETURN
400 ' define light horizontal li
ne
410 PRINT#-2,CHR$(27)+"*c2400A";
420 PRINT#-2,CHR$(27)+"*c1B";
430 RETURN
440 ' define heavy horizontal li
ne
450 PRINT#-2,CHR$(27)+"*c2400A";
460 PRINT#-2,CHR$(27)+"*c3B";
470 RETURN
480 ' define light vertical line
490 PRINT#-2,CHR$(27)+"*c1A";
500 PRINT#-2,CHR$(27)+"*c1900B";
510 RETURN
520 ' define heavy vertical line
530 PRINT#-2,CHR$(27)+"*c2A";
540 PRINT#-2,CHR$(27)+"*c1900B";
550 RETURN
560 ' print horizontal line at c
urrent x,y and increment
570 PRINT#-2,CHR$(27)+"*c0P";
580 PRINT#-2,CHR$(27)+"*p+38Y";
590 RETURN
600 ' print vertical line at cur
rent x,y and increment
610 PRINT#-2,CHR$(27)+"*c0P";
620 PRINT#-2,CHR$(27)+"*p+15X";
630 RETURN
```

really a very wide rectangle with little height. A vertical line is a very tall rectangle with little width.

A Worksheet-Printing Program

The above information is presented so that you can print the worksheets yourself. If you are lucky enough to own a laser printer with your CoCo, use the program in Listing 1. Otherwise, you will need access to an MS-DOS system with a laser printer. Almost any MS-DOS system and laser printer will do — the program is uncomplicated and without any special tricks. A Tandy LP-1000 laser printer setup at your local Tandy Computer Center is one possible source. (Or you can send for a free copy of the worksheets by writing to me at the address given at the end of this column.)

If you can run simple programs in BASIC on the CoCo, you can run the program on an MS-DOS system. At the C> prompt, enter GWBASIC. You should see BASIC load and display the title message. Enter the program exactly as shown, with the desired line substitutions as indicated for the different worksheets. Entering the program is the same as in CoCo BASIC. Re-entering a line number erases the old line and substitutes the new line in its place. LIST lists the current program. SAVE and LOAD work the same as in CoCo BASIC.

After the program has been entered, double check the code and enter RUN. In a few seconds, the laser printer should spew out the worksheet master.

If You Can't Find a Laser Printer...

It may not be easy to find a laser printer setup. If you would like master copies of the four worksheets, I'd be happy to oblige. Send a self-addressed, stamped 9-by-12 envelope. You may want to include a protective cardboard insert. I'll send you the masters immediately. There are things that slow the delivery process — for example, sending an enclosed note with a 200-page listing asking me to troubleshoot the program, or a money order for the postage without an envelope and instructions on how to air mail the package to Zimbabwe. Send the SASE to:

William Barden, Jr.
P.O. Box 3568
Mission Viejo, CA 92692

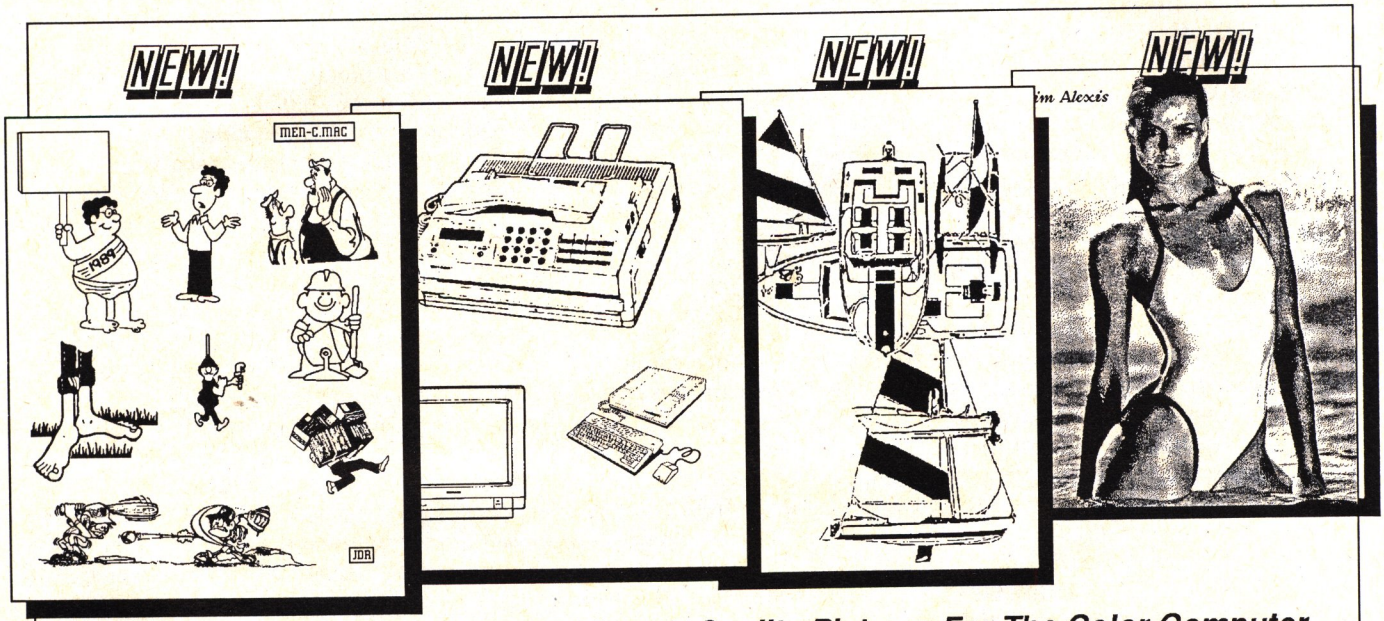
See you next month with more CoCo topics. ❑

Editor's Note: This listing requires a PC-compatible running MS-DOS and GWBASIC.

Listing 2: MSGRAPH

```
100 ' CoCo 640 by 192 Graphic Layout Plotter for LaserJet
110 WIDTH "LPT1:",255
120 OPEN "LPT1:" FOR OUTPUT AS #1
130 GOSUB 330
140 GOSUB 360
150 PRINT#1,CHR$(27)+"&f0S";
160 FOR I=1 TO 5
170 GOSUB 440:GOSUB 560
180 GOSUB 400
190 FOR J=1 TO 9:GOSUB 560:NEXT J
200 NEXT I
210 GOSUB 440:GOSUB 560
220 PRINT#1,CHR$(27)+"&f1S";
230 FOR I=1 TO 16
240 GOSUB 520:GOSUB 600
250 GOSUB 480
260 FOR J=1 TO 9:GOSUB 600:NEXT J
270 NEXT I
280 GOSUB 520:GOSUB 600
290 PRINT#1,CHR$(27)+"*p400X"+CHR$(27)+"*p2100Y";
```

```
300 PRINT#1,"Color Computer 3 640 by 192 Mode - Grid of 160 Horizontal by 50 Vertical Pixels"
310 PRINT#1,CHR$(27)+"E";
320 STOP
330 ' set landscape
340 PRINT#1,CHR$(27)+"&l1O";
350 RETURN
360 ' set margins
370 PRINT#1,CHR$(27)+"9";
380 PRINT#1,CHR$(27)+"&a13L";
390 RETURN
400 ' define light horizontal line
410 PRINT#1,CHR$(27)+"*c2400A";
420 PRINT#1,CHR$(27)+"*c1B";
430 RETURN
440 ' define heavy horizontal line
450 PRINT#1,CHR$(27)+"*c2400A";
460 PRINT#1,CHR$(27)+"*c3B";
470 RETURN
480 ' define light vertical line
490 PRINT#1,CHR$(27)+"*c1A";
500 PRINT#1,CHR$(27)+"*c1900B";
510 RETURN
520 ' define heavy vertical line
530 PRINT#1,CHR$(27)+"*c2A";
540 PRINT#1,CHR$(27)+"*c1900B";
550 RETURN
560 ' print horizontal line at current x,y and increment
570 PRINT#1,CHR$(27)+"*c0P";
580 PRINT#1,CHR$(27)+"*p+38Y";
590 RETURN
600 ' print vertical line at current x,y and increment
610 PRINT#1,CHR$(27)+"*c0P";
620 PRINT#1,CHR$(27)+"*p+15X";
630 RETURN
```

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Going Online: Primed and Ready

by Tony Olive
RAINBOW's Reviews/Submissions Editor

Among my duties at THE RAINBOW is the posting of information for a department called "The Intercom." If you read this section, and I hope you do, you know it contains names, addresses and phone numbers for Pens Pals, CoCo Clubs and BBSs. As I compiled these reports recently I was struck by the irony of my assignment. I am responsible for encouraging readers to patronize the avenues listed while I had never done so myself. I had never even used a modem.

My lack of understanding of online services plagued me for a few months. I was reeling with curiosity and questions about how to remove this self-imposed, dispassionate involvement with my work. There was only one solution to the challenge. I needed a modem.

I searched the office for a spare modem and soon realized this was not a piece of hardware allowed to sit and gather dust on a shelf. After a week or two I got rather impatient — impatient to use something that was completely foreign to me. The answers to my questions just couldn't wait. But I had dubious expectations about obtaining this mysterious device.

And then, there it was. The tiny Delta DM-1200 modem — small enough to fit in the palm of my hand yet powerful enough to allow me access to the world of online communications. I was eager to explore the limitless boundaries of an unknown territory. Filled with a new sense of quest, I gathered phone numbers for the available local services. My anticipation grew as I dialed Freeboard-Electronic Bulletin, a BBS run by the Louisville Free Public Library.

I discovered not a directory of books, but instead a database with a hodgepodge of topics intersecting a broad selection of interests. I must admit that most of my time was spent learning to maneuver in this new environment. The system was not immediately understood by *this* neophyte. Despite the inconvenience, I still thought this was a positive experience. I then called HUG BBS of Paducah, KY. It was easier to move around in this system. I splashed around HUG BBS for over an hour. (But I hadn't downloaded a file yet.) I said to myself, "This is great! I can't believe no one ever insisted I get a modem. Look at all this information!" The phone bill wasn't so great, but the experience was well worth the expense.

Going online and connecting to a BBS was my original interest. There are, however, a variety of other options available to modem users. A similar use is to connect to one of many online utility services. My current experience in this arena is limited to Delphi.

The difference between a BBS and an online utility service is startling. It is overwhelming to go from being the only person, or one of a few, connected to a BBS to an electronic room where thousands are gathered. The possibilities sank deeper. A whole new world opened at my fingertips. Again, I thought to myself, "Where have I been?"

On Delphi I found the extensive databases I had been hoping for, and conferences for computer-specific groups (they call these SIGs). For finding facts, making new friends and gathering technical information, this was pay dirt.

With all the interaction on a large network comes clutter. It's easy to spend a lot of time and money looking for information without a well executed search technique. Before you plunge head first into an online utility service, it is wise to purchase a user manual for that particular system. On the other hand, it is important to know that you *don't* have to be a technical wizard to enjoy a fruitful harvest from going online.

Another online practice is *remote computing*. This means one computer is controlled via a different computer or terminal. One product for the CoCo, CIII D-Link by Coless Computer Design, allows this. Just think of the possibilities. No more racing around town to gain access to a computer.

There is a vast sea of information waiting to be tapped. There are similarities between an isolated CoCo user and a caged animal. To daily endure the repetitive pace is boring — boring enough to make the animal a creature of complacency. How can an animal possibly learn about the unfamiliar territory outside the cage without further exploration? Going online releases the animal in us. The newfound waters are invigorating.

The bottom line is this: I was scared at the thought of going online in the beginning. But my curiosity overcame my fears and the results are fantastic. Of course it wasn't easy at first, but a little experimentation and a lot of questions to other (more-experienced) users paved the way to an exciting new world. I just wish I had gotten my modem sooner.

The online cruise of the century is still taking reservations. Just purchase a modem and swim a little closer to the life preservers. There are fellow shipmates waiting with helping hands.

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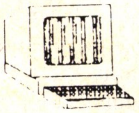

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Displaying Picture Files Using OS-9 Level II Graphics

Part II

by Tim Kientzle

Last month, we learned how to use OS-9 Level II's graphics capabilities to display simple uncompressed VEF and MGE format pictures. This month, we'll take a careful look at a general type of compression called *run-length encoding* (RLE) and expand the earlier programs to handle compressed MGE and VEF data.

Run-length decoding techniques and displaying images with OS-9 Level II

Why We Need Compression

One thing I pointed out in last month's article was that increased graphics resolutions mean more data. Compare the old PMODE 4, 256-by-192 pictures in two colors requiring 6K of storage space to HSCREEN 2, 320-by-200 pictures in 16 colors with over 31K of data. The typical CoCo with a 35-track, single-sided disk drive can store more than 20 PMODE 4 pictures on a disk, but only five uncompressed VEF or MGE images. There must be some way to improve this.

If you look closely at graphics pictures, you'll notice that many have large areas that are one solid color, or filled with some simple pattern. With careful thought, you might realize these areas consist of the same byte value repeated many times. Such a repeated value is often referred to as a *run*. A common technique that replaces each run with a code telling what value to repeat, and how many times to repeat it, is called *run-length encoding*. Although there are many ways to handle this encoding, each is only slightly different from the rest.

Simple RLE: The MGE Format

The most simple form of run-length encoding is to pretend the whole picture is just a sequence of runs. In other words, even if we have a value that is repeated just once, we'll think of it as a run of length one. Our decoding routine is very simple. Each run is stored as a count byte, followed by a value to repeat. In the following example, I use a series of letters, where single digits represent the run length.

Unencoded:

```
aaaaaaaaabbbbcdddefghhhh
```

Encoded:

```
9a4b1c3d1e1f1g4h
```

The unencoded version uses 23 bytes, whereas the encoded version takes only 16. If the data is filled with long runs, this method works well. Consider a solid black picture that is 320 by 200. (It isn't a very interesting picture, but a picture nonetheless.) The picture contains 32,000 bytes of graphics data using the unencoded method. With this new form of run-length encoding, it uses only 252 bytes. There are 125 codes with a count of 255 and a value of 0 and one code with a count of 125 and a value of 0 — quite a savings!

This method of encoding is used by the MGE compression format. You may recall I said last month that MGE compression isn't very good. The compression of 32,000 bytes down into 252 bytes sounds pretty good.

Tim Kientzle, currently pursuing a doctorate in mathematics at the University of California at Berkeley, has worked with the CoCo since 1982. He is best known in the CoCo world as the database manager for the CoCo SIG on Delphi, and as the author of the V-Term *terminal emulator. He can be reached on Delphi as TIMKIENTZLE. Or you can contact him at 14 Croxton Avenue, Oakland, CA 94611.*

What's the catch? The catch is that solid black pictures aren't very interesting. Consider how this compression method operates in a worst case scenario where there are no runs of more than one byte — for example, a picture with a great deal of detail or where the background is filled by a complex pattern. In this case, each byte of the original would be represented by a code with a count of one. Since there are 32,000 bytes in the original picture, this would result in a *compressed* image of 64,000 bytes! This hardly deserves the name compressed.

During the evaluation of any compression method, thought should always be given to the worst case. Any compression method lengthens some files, this is unavoidable. But good compression methods lengthen files only by a small amount. Many archiving programs, for instance, first read through the file and try to compress it. If the resultant file would be longer, these routines store the file uncompressed, which only lengthens it by the one byte needed to indicate that it is stored uncompressed. The most difficult thing to determine is how much ordinary files will be compressed. The only way this can be determined is with practice. In theory, this very simple method will compress many graphics files, but only by a small amount. Most graphics files contain a lot of single-byte runs, and this method does not work well with such runs.

Escape Codes: RAT and TC Formats

Needed are some simple changes to avoid having single-byte runs. An *escape code* is one such possibility. The escape code method is used by the RAT graphics format and the popular TC12, TC3, and TC31 archiving programs for Disk BASIC. The idea is to set aside one special value called an *escape value*. We use this special value to indicate an encoded run. It may be easier to start by thinking about a file that is already encoded. In this short example, the # is our escape code:

Unencoded:
```
abbbbbcdeeefghijjjjjjjjjkkklmnopp
```
Encoded:
```
a#5bcd#3efghi#9j#3klmnopp
```

For decoding purposes, the two bytes after the # character are a count and a value. An encoded run now takes three bytes instead of two. In this method single-byte runs or two-byte runs should not be encoded since either one would be lengthened. Note that pp at the end is unencoded. Encoding is not necessarily an efficient method for use with three-byte runs. Three bytes will be used with either method. The only subtlety in this method is in handling the escape value.

We must encode the escape value, even a single-byte run, if it is to be decoded. Try encoding the following sequence:

Unencoded:
```
abcd#efgh#ijkl
```

Did you remember to encode the # characters as one-byte runs? In this example the result is longer than what we start with. It might be challenging for you to figure out the worst case for this type of encoding. If you figure it out, though, you'll realize that even though the worst case is as bad as it was with simple RLE in terms of how much

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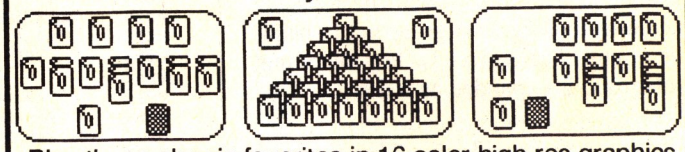

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the result is lengthened, it is less likely that someone would draw a picture like this!

A variation that avoids this problem is to pick the escape value differently for each picture — examine the entire data file and select the least-occurring value as your escape value. With this method, the worst case will lengthen a 32,000 byte picture to a quite reasonable 32,251 bytes. The biggest disadvantage is that we can only save space by encoding runs of four or more. In practice, this method works reasonably well for graphics files, but not as well for text or program files. These files have very few runs of any significant length.

There is a completely different approach that also works well in practice. Use special codes to identify runs and other codes to identify anti-runs. An *anti-run* is a sequence without any repetitions. Rather than starting with an explanation, let's look at an example. Consider the following encoded sequence of numbers:

5 17 -4 89 32 66 125 3 99 4 87 -3 14 53 66

To decode this, look at it as a sequence of small groups, each containing a count and some amount of data. If the count is positive, then it is followed by one value. If the count is negative, it is followed by that number of values. There are five groups in the above example. The first group is 5 and 17. The last group contains the numbers -3 14 53 66. A group with a positive count means that the value should be repeated that number of times. A group with a negative count is copied as is. For decoding, each group is expanded as follows:

5 17	->	17	17	17	17	17
-4 89 32 66 125	->	89	32	66	125	
3 99	->	99	99	99		
4 87	->	87	87	87	87	
-3 14 53 66	->	14	53	66		

The final, decoded sequence is:

17 17 17 17 17 89 32 66 125 99 99 99 87 87 87 87 14 53 66

Macintosh *MacPaint* pictures use almost this exact type of encoding, with one or two minor optimizations. IMG format uses this same idea, but instead of having a way to flag whether a group is a run or an anti-run, it simply alternates them. Squashed VEF uses a slight variation of this method where the high bit represents whether to repeat or copy the data, while the lower seven bits hold the actual count. Squashed VEF also makes a concession to ease programming — each half-line is compressed separately. This process makes decoding easier, since the decoding program can work on a line-by-line basis. With many compression methods there is data left from the end of one line which must be added to the beginning of the next line.

Look at Listing 1. A picture stored in Squashed VEF format has an 18-byte header made up as follows:

1 byte — Compression flag
1 byte — Screen-type code
16 bytes — Palette values

The compression flag is zero if the picture data is stored uncompressed and 128 if the picture data is squashed. The screen-type code is the same format as normal VEF, as described last month.

In uncompressed format, the picture data is stored as 200 lines of graphics data. In squashed format, the picture data is stored as 400 packets with each encoding one-half of a screen line. The first byte of a packet indicates the number of encoded data bytes that follow. The encoding consists of a series of groups. Each group has a count byte. If the count byte has the high bit set, the count byte is followed by a single data byte. The lower seven bits indicate how many times to repeat the data byte. If the high bit of the count byte is clear, the count byte is followed by that many bytes of data. The data is copied as is.

Traditionally, 192-line images have been stored in VEF format by adding eight blank lines to the top of the picture. When displaying VEF pictures on a 192-line screen, the top eight lines are usually not displayed. Color cycling, when used, rotates palettes 8 through 15.

Comments on the Listings

Last month I said that a goal of the program design was to make modifications easier. This month we reap the benefits of that approach. With `GetLine`, only one procedure needs to change in order to handle both normal and squashed VEF pictures.

Listing 1 shows the new `GetLine` procedure, as well as two new procedures which allow the program to complete its work. `GetLine` checks the compression value. If this value is non-zero, it calls `GetPacket` and `UnSquash` to decode two packets, one for each half of this line.

512K OS-9 Level II

Listing 1: `GetLine.b09`

```
PROCEDURE GetLine
 0000       (* Gets one line of graphics data from the file into "line".
 003C       (* "bytes" is the length of the line expected, "compress"
 0075       (* is the compression format
 0091       BASE 0
 0093       TYPE LineType=long(160):BYTE; short(80):BYTE
 00AE
 00AF       PARAM path:BYTE
 00B6       PARAM bytes:INTEGER
 00BD       PARAM compress:INTEGER
 00C4       PARAM line:LineType
 00CD
 00CE       DIM buffer(300):BYTE
 00DA
 00DB       IF compress=0 THEN  \(* 0 means no compression
 0100         IF bytes>80 THEN
 010C           GET #path,line.long
 011A         ELSE
 011E           GET #path,line.short
 012C         ENDIF
 012E       ELSE  \(* compress is not zero
 0149         RUN GetPacket(path,buffer)
 0158         RUN UnSquash(buffer,line,0,bytes)
 016F         RUN GetPacket(path,buffer)
 017E         RUN UnSquash(buffer,line,bytes/2,bytes)
 0199       ENDIF
 019B       END

PROCEDURE UnSquash
 0000       (* UnSquash data in buffer to line starting at linepos
 0036       BASE 0
 0038       TYPE LineType=long(160):BYTE; short(80):BYTE
 0053
 0054       PARAM buffer(300):BYTE
 0060       PARAM line:LineType
 0069       PARAM linepos,bytes:INTEGER
 0074
 0075       DIM bufpos,linestop:INTEGER
 0080       DIM i,runend:INTEGER
 008B       DIM temp:BYTE
 0092       (* First, uncompress into line.long
 00B5       bufpos=-1 \linestop=linepos+bytes/2 \i=linepos
 00D4     WHILE i<linestop DO  \(* Keep going until we get to the stopping point
 0111         bufpos=bufpos+1
```

```
011C        runend=i+LAND(buffer(bufpos),127)-1 \(* Find where this group will
end
0152          IF runend>159 THEN  \(* Some Squashed VEF files have problems...
0189            runend=159
0190          ENDIF
0192          IF buffer(bufpos)>127 THEN  \(* If high bit set,
01B4            temp=buffer(bufpos+1)
01C2            bufpos=bufpos+1
01CD            FOR i=i TO runend
01DF              line.long(i)=temp \(* Repeat this value.
0203            NEXT i
020E          ELSE
0212            FOR i=i TO runend \(* Otherwise,
0231              bufpos=bufpos+1
023C              line.long(i)=buffer(bufpos) \(* copy data straight.
0264            NEXT i
026F          ENDIF
0271        ENDWHILE
0275
0276        IF bytes<160 THEN  \(* Is this a short line?
029A          FOR i=0 TO 79
02AA            line.short(i)=line.long(i) \(* Copy data to line.short
02D9          NEXT i
02E4        ENDIF
02E6        END

PROCEDURE GetPacket
0000        (* Gets one Squashed packet from the input path
002F        BASE 0
0031        PARAM path:BYTE
0038        PARAM buffer(300):BYTE
0044
0045        DIM bufsize:BYTE
004C        DIM i:INTEGER
0053
0054        GET #path,bufsize \(* Get the size of the packet
007B        FOR i=0 TO bufsize-1 \(* Read that many bytes
00A6          GET #path,buffer(i)
00B4        NEXT i
00BF        END
```

Listing 2: GetPacket.b09

```
PROCEDURE GetPacket
0000        (* Gets one Squashed packet from the input path
002F        (* Uses the I$Read system call to read the entire packet
0067        (* at once, which is much faster.
0088        BASE 0
008A        TYPE Registers=CC,A,B,DP:BYTE; X,Y,U:INTEGER
00AF        PARAM path:BYTE
00B6        PARAM buffer(300):BYTE
00C2        DIM bufsize:BYTE
00C9        DIM regs:Registers
00D2
00D3        GET #path,bufsize \(* Get the packet size
00F3        regs.A=path \(* A register holds the path
011B        regs.X=ADDR(buffer) \(* X register holds the buffer address
014F        regs.Y=bufsize \(* Y register holds the size
0177        RUN SysCall($89,regs) \(* Read data into buffer
019D        END
```

UnSquash performs the actual decoding. The program is written in an unusual manner. The count byte is used to determine how long the group will be after it is decoded. The data is then copied to fill up to that point. We must be careful to make sure runend doesn't get too big, or we might go beyond the end of the line.long array. Some early programs that tried to use Squashed VEF format encoded extra junk data into each line, which should be ignored. Another strange thing about this program is that it always decodes into the line.long array, and copies it into line.short if we are using a format with only 80 bytes per line. This was done for simplicity.

GetPacket actually reads a packet from the file. It gets the size value and reads that number of bytes. Listing 2 shows another listing for GetPacket that uses a system call to read the entire packet at once instead of reading it one byte at a time. This change alone doubles the speed of the program. Try both methods for comparison.

Homework

To stay busy until next month, keep working on the MGE viewer you started writing last month. The next obvious addition is to get it to support MGE compression. Last month I gave you the format of an MGE header so you can determine whether or not a file is compressed. The compression used is the very simple run-length encoding I described at the very beginning of this article. The only catch is that you might have a single run that includes both the end of one line and the beginning of the next one. You might want to consider adding some variables in the main program that are passed to the GetLine procedure so it can store these unfinished runs.

Next month, I'll talk about two more compression formats, CM3 and GIF. I will also delve a little deeper into some of the details of OS-9 graphics.

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FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

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For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

Novices Niche

Utility 16K Extended

Pop-Up Menus
by Douglas Liming

While writing long programs, most of my time is spent making menus each time one is needed. I knew there had to be a faster way. To expedite the creative process I developed an automatic menu generator that I call *Pop-up*.

Pop-up is a subroutine that centers, allows for a heading, and takes the menu choices from a data statement. I added a bit of color to make the routine look a little more professional. The menu's operation is simple. By using the up and down arrow keys, you align the dot with your choice and press the ENTER key.

This version is a demo and only prints what the user chooses. Replacing Line 290 with a RETURN command transfers control back to the main program and the user's choice is stored in the array PIC$. The heading can be altered by changing Line 30. The data statement I used is in Line 60, using a FOR...NEXT loop to read the data. Changing COUNT (Line 20) or using the RESTORE command will be necessary for using this routine a number of times within your program. I am sure you will find this program to be a valuable subroutine.

The Listing: POPUP

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 'POP-UP MENUS.BY:DOUGLAS B. L
IMING
20 CLS 3 : COUNT=5 : BL=128 + 16
 * (3-1) + 15 : DIM ITEM$(12),CH
EK$(12,15)
30 PRINT : PRINT :PRINT @ 10,"PO
P-UP MENU" : PRINT @ 39,"BY: DOU
GLAS B. LIMING" : PRINT
40 FOR H=0 TO 63 : SET (H,5,2) :
 NEXT H
50 FOR Y=1 TO COUNT : READ ITEM$
(Y) : NEXT Y
60 DATA ITEM ONE,ITEM TWO,ITEM T
HREE,ITEM FOUR,ITEM FIVE
70 FOR U=1 TO COUNT : FOR T=U+1
TO COUNT
80 IF LEN(ITEM$(U))>LEN(ITEM$(T)
) THEN BIG$=ITEM$(U) ELSE BIG$=I
TEM$(T)
90 NEXT T : NEXT U
100 HOP=LEN(BIG$) : BIG=INT(HOP/
2) : BEGIN=15-BIG
110 SPCE$=" "
120 FOR D=1 TO HOP : SPCE$=SPCE$
+" " : NEXT D
130 START=INT(COUNT/2) : OPS=STA
RT*32 : OP=256-OPS : ST=BEGIN+(O
P-1)
140 FOR K=1 TO COUNT
150 JAKE=INT((BEGIN+OP)/32) : PR
INT @ BEGIN+OP,SPCE$;
160 CHEK$(K,JAKE)=ITEM$(K) : PRI
NT @ BEGIN+OP,ITEM$(K); : OP=OP+
32 : NEXT K
170 HOT=ST
180 PRINT @ ST,"*";
190 PUSH$=INKEY$ : IF PUSH$<>CHR
$(94) AND PUSH$<>CHR$(10) AND PU
SH$<>CHR$(13) THEN 190
200 PRINT @ ST,CHR$(BL);
210 IF PUSH$=CHR$(94) THEN IF ST
<>HOT THEN ST=ST-32 ELSE ST=HOT+
(32*(COUNT-1))
220 IF PUSH$=CHR$(10) THEN IF ST
<>HOT+(32*(COUNT-1)) THEN ST=ST+
32 ELSE ST=HOT
230 IF PUSH$=CHR$(13) THEN SOUND
 190,1 :GOTO 250
240 GOTO 180
250 FOR Y=1 TO COUNT
260 DAW=INT(ST/32)
270 IF CHEK$(Y,DAW)=ITEM$(Y) THE
N PIC$=CHEK$(Y,DAW)
280 NEXT Y
290 CLS : PRINT @ 192,"YOU CHOSE
 ";: PRINT PIC$
300 END
```

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Check Your Calendar

by Steve Blyn
Contributing Editor

I thought a program on reading and using calendars would be a timely subject this month. Reading calendars is a language-arts skill usually taught in the second or third grade. The program I've written is suitable for any student who needs to learn or review this skill. It is also a neat introduction to mathematical grids.

Calendar presents a calendar for the month of November, 1990. There are seven vertical columns that stand for the days of the week. The letters that head each column stand for the names of the days of the week.

There are five horizontal rows, each of which represents one week or part of one week in the month. The dates are printed in the blocks formed by the rows and columns. This arrangement of rows and columns is called a grid. Students encounter such grids in math and computer studies.

The students should first become familiar with reading the calendar by answering verbal questions such as:

- How many Mondays or Thursdays are there in November?
- How many complete weeks are there in November? How many extra days (beyond four weeks)?
- On what dates do the first and last Sundays or Wednesdays of this month fall?
- Jane cleaned the dishes every Monday and/or Friday this month. How many times did she do the dishes in November?
- Sam went fishing every weekend day in November. How many times did he fish in November?

Calendar presents a calendar for the month of November, 1990. There are seven vertical columns for the days of the week, and five horizontal rows.

Personal questions that refer to school events or childrens' birthdays can also be used. And questions about holidays are certainly applicable.

The type of questions shown as examples are specific and require a single answer. For this reason they are appropriate as verbal questions rather than computer-generated questions. Also required is a verbal explanation should the students have difficulty understanding them. The computer program, on the other hand, uses random numbers that change for each example. When the student answers the question, only the numerical answer needs to be entered. The month and date are not accepted as a correct answer.

The program draws the calendar from lines 40 through 100. The spacing used on these lines is important to help keep the screen accurate. Lines 140 through 310 contain questions and answers. They are designed to ask the students questions in order to help them gain experience using a calendar. Six types of questions are randomly generated. The random numbers used are controlled by Line 120. Hundreds of individual problems are possible within the limits of these parameters. The child's knowledge of addition and subtraction of two-digit numbers is necessary. Students may use either pencil and paper or solve the problems mentally, depending on their abilities.

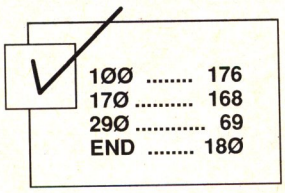
Each example is checked for correctness on lines 320 and 330. Correct answers receive a happy tune and a message. If an incorrect response is given, the right answer is displayed. After each example, the student may press E to end the program or ENTER to go on to another question. No scorecard is necessary, as most students will master this activity after a number of sessions.

This program lends itself to many modifications. You may first want to change any of the six computer-generated questions. As you change a question, be aware of the random variables in Line 120. These are combined into the variable Y that appears in the program after each question. Variable Y contains the correct answer. You may also want to use the ideas in this program to create a similar program for another month.

❑

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

16K Extended



The Listing: CALENDAR

```
10 REM"READING A CALENDAR"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1990"
30 CLS5:R=RND(-TIMER)
40 PRINT@3,"calendar for novembe
r,1990";
50 PRINT@64,"   S   M   T   W
T   F   S    "
60 PRINT@115,"1   2   3       "
70 PRINT@131,"4   5   6   7   8
  9  10      "
80 PRINT@162,"11  12  13  14  15
  16  17      "
90 PRINT@194,"18  19  20  21  22
  23  24      "
100 PRINT@226,"25  26  27  28  2
9  30         ";
110 SOUND 250,1:PRINT@288,STRING
$(64," ");:PRINT@384," ":PRINT@2
88,"";
120 A=1+RND(23):B=1+RND(17):C=1+
RND(20):D=RND(8)+1:E=RND(19)+1:F
=RND(10)+20:G=RND(2)+1
130 S=RND(6):ON S GOTO 140,170,2
00,230,260,290
140 PRINT"ELECTION DAY IS ON NOV
EMBER 4.  WHAT DATE IS";A;"DAYS
LATER";
150 INPUT Z
160 Y=4+A:GOTO 320
170 PRINT"VETERANS DAY IS ON NOV
EMBER 12. WHAT DATE IS";B;"DAYS
LATER";
180 INPUT Z
190 Y=12+B:GOTO 320
200 PRINT"THANKSGIVING IS ON NOV
EMBER 22. WHAT DATE IS";C;"DAYS
EARLIER";
210 INPUT Z
220 Y=22-C:GOTO 320
230 PRINT"WHAT DATE IS";D;"DAYS
AFTER":PRINT"NOVEMBER";E;
240 INPUT Z
250 Y=D+E:GOTO 320
260 PRINT"WHAT DATE IS";E;"DAYS
BEFORE":PRINT"NOVEMBER";F;
270 INPUT Z
280 Y=F-E:GOTO 320
290 PRINT"WHAT DATE IS";G;"WEEKS
 AFTER":PRINT"NOVEMBER";D;
300 INPUT Z
310 Y=D+(7*G):GOTO 320
320 IF Z=Y THEN PRINT@396,"CORRE
CT":PLAY"L30CDEFGGG"
330 IF Z<>Y THEN PRINT@384,"SORR
Y,";Y;"IS THE ANSWER.":PLAY"L4B-
"
340 EN$=INKEY$
350 IF EN$=CHR$(13) THEN 110 ELS
E IF EN$="E" THEN 360 ELSE 340
360 CLS:END
```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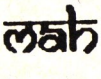

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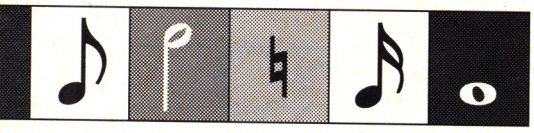
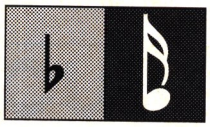


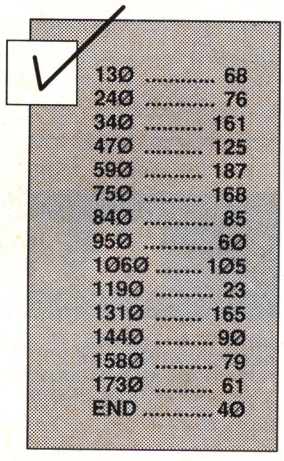


An instrumental program for tracking your tunes

Music Catalog

by Giancarlo Pillot

16K Disk



A problem often encountered by music collectors is how to inventory their collections. If the collection is large, this is usually quite a chore. *Music Catalog* is designed to give collectors an easily accessible way to keep track of their tunes.

Music Catalog has a number of worthwhile purposes. This program is ideal for users who cannot afford a commercial program, have a small system with little memory or simply can't figure out how to use their current database. The program is very easy to use and completely menu-driven.

The first menu allows you to load and save files, edit the current file or see the disk directory. The Load and Save functions are self-explanatory. Keep in mind that filenames must be eight characters or less and must not include any extensions, periods or slashes (/). The disk directory is immediately retrieved from the current drive and can be paused using SHIFT-@.

The Edit selection of the main menu allows you to add, delete, print or sort the file. Sorting the file at this point puts the contents in alphabetical order by title or artist, but future additions are not inserted in alphabetical order. You'll need to re-sort. The Print function allows you to print the entire file with or without the listed headings of artist, title, format of record (tape, record, CD, ect.), and type of music.

Music Catalog runs on any system with at least 16K Extended BASIC and a disk drive. If you are using a 16K system, you must enter `PCLEAR 1` before running the program. Also, change line 70 to the baud required for your printer. ❑

Giancarlo Pillot uses his pair of CoCo 2s to write software for himself and friends. Most of his experience is with BASIC and assembly language. For further information, he may be contacted at 2938 Saratoga, Troy, MI 48083.

The Listing: `MUSIC`

```
Ø 'COPYRIGHT 199Ø FALSOFT, INC.
1Ø 'MUSIC CATALOGUE
2Ø 'BY GIANCARLO PILLOT
3Ø 'MADE APRIL, 199Ø
4Ø 'VERSION 1.ØØ
5Ø CLEAR 1ØØØ
6Ø DIM T$(1ØØ),A$(1ØØ),F$(1ØØ),T
Y$(1ØØ)
7Ø POKE 15Ø,18 'REM SET BAUD RAT
E HERE, CURRENTLY AT 24ØØ
8Ø CLS 1
9Ø PRINT "THE MUSIC CATALOGUE"
1ØØ PRINT "BY GIANCARLO PILLOT"
11Ø PRINT STRING$(32,131);
12Ø PRINT
13Ø PRINT "PLEASE CHOOSE AN OPTI
ON:"
14Ø PRINT TAB(3);"(1) LOAD A FIL
E"
15Ø PRINT TAB(3);"(2) SAVE A FIL
E"
16Ø PRINT TAB(3);"(3) EDIT CURRE
```

```
NT FILE"
170 PRINT TAB(3);"(4) GET A DISK
 DIRECTORY"
180 A$=INKEY$
190 IF A$<"1" OR A$>"4" THEN 180
200 G=VAL(A$)
210 ON G GOTO 240,450,640,1860
220 STOP
230 'THE FOLLOWING ROUTINE IS
FOR LOADING FILES
240 CLS
250 PRINT@64,"A FILENAME IS 8 CH
ARACTERS OR"
260 PRINT " LESS AND CONTAINS NO
 PERIODS"
270 PRINT " (.) OR SLASHES (/)"
280 PRINT
290 PRINT "ENTER <^> TO GO BACK"
300 PRINT@0,"NAME OF FILE TO LOA
D";
310 INPUT FILE$
320 IF LEN(FILE$)>8 OR LEN(FILE$
)<1 OR INSTR(FILE$,"/") OR INSTR
(FILE$,".") THEN SOUND 100,1:GOT
O 300
330 IF FILE$="^" THEN 80
340 X=1
350 SIZE=0
360 OPEN "I",#1,FILE$+".CAS"
370 IF EOF(1)=-1 THEN 410
380 INPUT #1,T$(X),A$(X),F$(X),T
Y$(X)
390 X=X+1
400 GOTO 370
410 SIZE=X-1
420 CLOSE #1
430 GOTO 80
440 'THE FOLLOWING ROUTINE IS
FOR SAVING FILES
450 CLS
460 PRINT@64,"A FILENAME IS 8 CH
ARACTERS OR"
470 PRINT " LESS AND CONTAINS NO
 PERIODS"
480 PRINT" (.) OR SLASHES (/)"
490 PRINT
500 PRINT "ENTER <^> TO GO BACK"
510 PRINT@0,"NAME OF FILE TO SAV
E";
520 INPUT FILE$
530 IF LEN(FILE$)>8 OR LEN(FILE$
)<1 OR INSTR(FILE$,"/") OR INSTR
(FILE$,".") THEN SOUND 100,1:GOT
O 510
540 IF FILE$="^" THEN 80
550 OPEN "O",#1,FILE$+".CAS"
560 FOR X=1 TO SIZE
570 WRITE#1,T$(X)
580 WRITE#1,A$(X)
590 WRITE#1,F$(X)
600 WRITE#1,TY$(X)
610 NEXT X
620 CLOSE #1
630 GOTO 80
640 CUR=1
650 'DISPLAY/ EDIT MODE
660 CLS
670 PRINT "RECORD #";CUR
680 PRINT"ARTIST:"
690 PRINT A$(CUR)
700 PRINT"TITLE:"
710 PRINTT$(CUR)
720 PRINT "FORMAT OF RECORDING:"
730 PRINT F$(CUR)
740 PRINT "TYPE OF MUSIC:"
750 PRINT TY$(CUR)
760 PRINT
770 PRINT " aDD  sORT  dELETE  p
RINT  qUIT"
780 PRINT "UP AND DOWN ARROWS TO
 VIEW"
790 IF SIZE=100 THEN PRINT:PRINT
"FILE FULL"
800 IF SIZE=0 THEN PRINT:PRINT "
FILE EMPTY"
810 A$=INKEY$
820 IF A$="^" AND CUR<SIZE THEN
CUR=CUR+1:GOTO 660
830 IF A$=CHR$(10) AND CUR>1 THE
N CUR=CUR-1:GOTO 660
840 IF A$="A" AND SIZE<100 THEN
910
850 IF A$="S" THEN 1050
860 IF A$="D" THEN 1380
870 IF A$="P" AND SIZE>0 THEN 15
20
880 IF A$="Q" THEN 80
890 GOTO 810
900 'ADD SELECTION
910 CLS
920 PRINT "TYPE 31 CHARACTERS OR
 LESS IN    RESPONSE"
930 LINEINPUT "ARTIST: ";A$(SIZE
+1)
940 A$(SIZE+1)=LEFT$(A$(SIZE+1),
31)
950 LINEINPUT "TITLE: ";T$(SIZE+
1)
960 T$(SIZE+1)=LEFT$(T$(SIZE+1),
31)
970 LINE INPUT "FORMAT OF RECORD
ING: ";F$(SIZE+1)
980 F$=LEFT$(F$,31)
990 LINE INPUT "TYPE OF MUSIC: "
;TY$(SIZE+1)
1000 TY$(SIZE+1)=LEFT$(TY$(SIZE+
1),31)
1010 SIZE=SIZE+1
1020 CUR=SIZE
1030 GOTO 660
1040 'SORTING BY SINGLE BUBBLE
1050 CLS
1060 PRINT "WOULD YOU LIKE TO SO
RT BY:"
1070 PRINT TAB(3);"(1) ARTIST"
1080 PRINT TAB(3);"(2) TITLE"
1090 A$=INKEY$
1100 IF A$="1" THEN 1130
1110 IF A$="2" THEN 1250
1120 GOTO 1090
1130 PRINT:PRINT "SORTING..."
1140 F=0
1150 FOR X=1 TO SIZE-1
1160 IF A$(X)<=A$(X+1) THEN 1220
1170 T$=T$(X):T$(X)=T$(X+1):T$(X
+1)=T$
1180 T$=A$(X):A$(X)=A$(X+1):A$(X
+1)=T$
1190 T$=F$(X):F$(X)=F$(X+1):F$(X
+1)=T$
1200 T$=TY$(X):TY$(X)=TY$(X+1):T
Y$(X+1)=T$
1210 F=1
1220 NEXT X
1230 IF F=1 THEN 1140
1240 GOTO 660
1250 PRINT:PRINT "SORTING..."
1260 F=0
1270 FOR X=1 TO SIZE-1
1280 IF T$(X)<=T$(X+1) THEN 1340
1290 T$=T$(X):T$(X)=T$(X+1):T$(X
+1)=T$
1300 T$=A$(X):A$(X)=A$(X+1):A$(X
+1)=T$
1310 T$=F$(X):F$(X)=F$(X+1):F$(X
+1)=T$
1320 T$=TY$(X):TY$(X)=TY$(X+1):T
Y$(X+1)=T$
1330 F=1
1340 NEXT X
1350 IF F=1 THEN 1260
1360 GOTO 660
1370 'DELETE A SELECTION
1380 IF SIZE<1 THEN 660
1390 PRINT:PRINT"ARE YOU SURE? (
Y/N)"
1400 A$=INKEY$:IF A$="" THEN 140
0
1410 IF A$="N" THEN 660
1420 FOR X=CUR TO SIZE-1
1430 T$(X)=T$(X+1)
1440 A$(X)=A$(X+1)
1450 F$(X)=F$(X+1)
1460 TY$(X)=TY$(X+1)
1470 NEXT X
1480 SIZE=SIZE-1
1490 IF CUR>SIZE THEN CUR=SIZE
1500 GOTO 660
1510 'PRINTING..
1520 CLS
1530 PRINT "DO YOU WANT TO PRINT
 WITH"
1540 PRINT " HEADINGS (Y/N)"
1550 A$=INKEY$
1560 IF A$="" THEN 1550
1570 IF A$="N" THEN 1730
1580 PRINT "PRESS ANY KEY OR <^>
 TO ABORT"
1590 A$=INKEY$:IF A$="" THEN 159
0
1600 IF A$="^" THEN 660
1610 FOR X=1 TO SIZE
1620 PRINT#-2
1630 PRINT#-2,"ARTIST:"
1640 PRINT#-2,A$(X)
1650 PRINT#-2,"TITLE:"
1660 PRINT#-2,T$(X)
1670 PRINT#-2,"FORMAT:"
1680 PRINT#-2,F$(X)
1690 PRINT#-2,"TYPE OF MUSIC:"
1700 PRINT#-2,TY$(X)
1710 NEXT X
1720 GOTO660
1730 PRINT"PRESS ANY KEY OR <^>
TO ABORT"
1740 A$=INKEY$
1750 IF A$="" THEN 1740
1760 IF A$="^" THEN 660
1770 FOR X=1 TO SIZE
1780 PRINT#-2
1790 PRINT#-2,A$(X)
1800 PRINT#-2,T$(X)
1810 PRINT#-2,F$(X)
1820 PRINT#-2,TY$(X)
1830 NEXT X
1840 GOTO 660
1850 'DIRECTORY
1860 CLS
1870 DIR
1880 PRINT FREE(0);"FREE GRANULE
S"
1890 LINE INPUT "PLEASE PRESS <E
NTER>";L$
1900 GOTO 80
```

New Delphi Rates

by Eddie Kuns
OS-9 SIG Database Manager

Delphi has revised its entire rate schedule. The net result of this action is big savings for most users. The two options are the Basic Plan and the 20/20 Advantage Plan. These plans no longer include telecommunications fees when you are calling direct or via Tymnet.

The Basic Plan costs $5.95 per month and includes the first hour online. Each additional online hour is $6. Members of the 20/20 Advantage Plan (all current Advantage Plan members are automatically switched over) receive the first 20 hours of evening access for $20, and each additional hour is $1.20. If you haven't logged onto Delphi for several months don't worry, you won't automatically be billed for the monthly Basic Plan fee. You'll be enrolled in one of the two plans only after the next time you dial into Delphi.

Coupled with these price reductions, members now receive free access to help files, billing and other service-related information in the Using Delphi section on the Main menu.

Before I list the telecommunication fees, let me describe the final change. Evening access now starts at 7p.m. Be careful if you normally dial in at 6p.m. Note that these fees are applicable at all times, including the first hour of the Basic Plan and the first 20 hours of the 20/20 Advantage Plan. The add-on telecommunication fees to remember are shown in Table 1.

New in the OS-9 Databases

Those interested in the new "CoCo 4" machines should download the `MM/1 and Tomcat News Release` and `OSKer Magazine Announcement` file groups in the General Information database. *OSKer* supports the new machines, which run OSK, OS-9 for the 68000 family of CPUs. **Paul Seniura** released a preliminary version of *Weather Radar*, a program that allows you to view National Weather Service B-scan reflectivity plots, in the Applications database.

Mike Sweet posted the newest version of *Print*, a print spooler, in the Utilities database. He also released `cgfx.1` Version 4, a C graphics library. Check it out in the Programmer's Den area.

Bruce Isted contributed device drivers for The Eliminator and patches to enable the CoCo to use an IBM-style serial mouse. **John Wesson's** *King's Quest III* patches allow you to use **Rick Adams'** `vi` patches

---

Eddie Kuns is pursuing a PhD in physics at Rutgers University. He lives in Aurora, Illinois and works as a programmer and researcher at Fermilab. Eddie is co-manager of the CoCo SIG; his username is EDDIEKUNS.

Database Report

0S-9 SIG

General Information

```
OSKER MAGAZINE ANNOUNCEMENT
   RAMMER        Jim Hutchins
BADPUNS
   WJMOORE       Warren Moore
MM/1 AND TOMCAT NEWS RELEASE
   COLINMCKAY    Colin McKay
```

Applications

```
FORTUNE COOKIES!
   ZACKSESSIONS Zack Sessions
WEATHER RADAR
   PAULSENIURA  Paul Seniura
DUNGEON GAME
   MPASSER       Mike Passer
PHIL'S SIMPLE TEXT FORMATTER V2.
   THEFERRET     Philip Brown
STAR FRONTIERS HELPER
   JBARRETT      John Barrett
MINI FORTUNE DATABASE CLONE
   MATHOMPSON Matthew Thompson
```

Utilities

```
DIRECTORY SORT UTILITY
   CTL56 Roger Lawson
PRINT (VERSION 2)
   DODGECOLT     Mike Sweet
PRINTER SET FOR DMP-106,105
   LDMOORE       Larry Moore
```

Device Drivers

```
ELIMINATOR SOFTWARE AND MANUAL
   BRUCEISTED    Bruce Isted
```

Patches

```
SERIAL MOUSE PATCHES
   BRUCEISTED    Bruce Isted
KINGS QUEST III PATCH
   DOCBEAR       John Wesson
```

Telcom

```
WIZ AUTO HELP
   OS9UGED       Bill Brady
```

Graphics & Music

```
RONDO ALLA TURCA
   XLIONX        Mark W. Farrell
PINBALL MACHINE
   TANGERINE     Jeff Chapin
PATCH TO SPIRO
   ZACKSESSIONS Zack Sessions
X-MEN AND FRIENDS
   NES  Eric Stringer
BUGS.AR
   COLINMCKAY    Colin McKay
JESSICA.AR
   COLINMCKAY    Colin McKay
TEENAGE MUTANT NINJA TURTLES
   MSCHNEIDER    Mike Schneider
MORE SIMPSONS
   MSCHNEIDER    Mike Schneider
GO BULLS! (VEF GRAPHIC)
   ZACKSESSIONS Zack Sessions
BELLS OF SAINT MARY
   CTL56 Roger Lawson
CASIO CT-630 UMUSE3 SONGS
   DMACIAS       David Macias
MOZART
   HAZE Hadley Hazen
ENTIRE STAR TREK THEME
   MATHOMPSON Matthew Thompson
```

	Home Time/hr	Office Time/hr
Dial Direct	No charge	No charge
via PC Pursuit	No charge	No charge
via Tymnet	No charge	$9
Prepaid International	$1.80	$1.80
via Telenet or SprintNet	$1.80	$12
Canada via Tymnet	$1.80	$12
Alaska, Hawaii, Puerto Rico	$12	$12

Figure 1: New Telecommunications Fees

to *TS/Edit* by renaming `vi` to `vq`. The Graphics & Music database saw a lot of action, receiving plenty of digitized sound files (including the entire *Star Trek* theme, submitted by **Matthew Thompson**), scores for *UltiMusE*, graphics and more.

And in the CoCo SIG . . .

Tim Koonce posted a text file describing how to upload to the Delphi databases. Continuing the trend, the CoCo 3 Graphics section saw the most action, receiving quite a number of DS-69B graphics, some in 4096 colors thanks to the skills of **Michael Trammell**. **Eddie Offerman** released a demo of *Revelation!* (a DECB Enhancement) in Utilities and Applications.

Staff Changes

As many of you are already aware, there have been some changes in the CoCo and OS-9 SIG staffs. **Rick Adams** (RICKADAMS) is the new CoCo SIG database manager. **Tim Kientzle** (TIMKIENTZLE) is taking over Rick's duties as the OS-9 consultant — feel free to ask him any questions you might have. Many of you already know Tim as **Tim Koonce**, previously the CoCo SIG database manager. Tim changed his name recently when he got married. Rounding out the changes, I have assumed the title of OS-9 SIG database manager.

❑

SIMPSONS
MSCHNEIDER Mike Schneider

Programmers Den
CGFX COMPATIBLE LIBRARY
DODGECOLT Mike Sweet

68K-OS9
INDEX OF TOP SOFTWARE (OSK)
TJMARTIN Timothy Martin

CoCo SIG

General Information
UPLOADING TO THE DATABASES
TIMKOONCE Tim Koonce

CoCo 3 Graphics
PIX FILE FIXER
STEVEPDX Donald Ricketts
KATY33.ARC
TRAS Richard P. Trasborg
ROCK/POP DS69B COLOR PICS
STEVEPDX Donald Ricketts
MORE DS69D 16-LEVEL NUDES
STEVEPDX Donald Ricketts
MANUAL (GIF/MGE)
MPMARTIN Mike Martin
GIF/MGE PARROT
MPMARTIN Mike Martin
MORE 4096 COLOR DS69B NUDES
STEVEPDX Donald Ricketts
GIF BABE IN SHORTS
MPMARTIN Mike Martin
4096 DS69B PICS FOR THE FAMILY
STEVEPDX Donald Ricketts
DS69B 4096 COLOR NUDES
STEVEPDX Donald Ricketts
4096 COLOR OF JISE'L NUDE
STEVEPDX Donald Ricketts
4096 COLOR DS69B NUDE
STEVEPDX Donald Ricketts
4096 FILE OF ROGER RABBIT
STEVEPDX Donald Ricketts
DS69B COLOR FILE OF BALD EAGLE
STEVEPDX Donald Ricketts
C-SEE3.3 SOFTWARE W/PRINT
STEVEPDX Donald Ricketts
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BOB GUCCIONE'S GIRLS, JUNE 1990
STEVEPDX Donald Ricketts
TV/VIDEO GIRLS
STEVEPDX Donald Ricketts
SET OF 14 FONTS
PYROMANIAC Richard Goedeken
AWESOME COCO 3 DEMO
PYROMANIAC Richard Goedeken
CC3DEMO.BIN
ALANDEKOK Alan DeKok
COLLEGE CO-ED - 4096
BERNIEO Bernie Olsen

Utilities & Applications
SIMPLE SAMPLE
MPMARTIN Mike Martin
REVELATION! DEMO PROGRAMS
FROSTBYTE Eddie Offermann
RAMTEST PROGRAM 1.11
PYROMANIAC Richard Goedeken
DATABASE PROGRAM
PYROMANIAC Richard Goedeken
SIMPLY BETTER BOOT
DSRTFOX Francis Swygert

Games
THE NORT CHALLENGE!
ALKIMBALL Alvin Kimball
ZENIX
JEMGE Judy Emge

Music & Sound
RONDEAU.ORC
BANDMAN Gary N. McCarty
BUCKERUP.SND
MICHAELJN Mike Nelson
BFINGR.SND
MICHAELJN Mike Nelson
SEASONS IN THE SUN
RONANDERSON Ron Anderson
ASSORTED SONGS FOR LYRA
RONANDERSON Ron Anderson
POLKAS AND WALTZES
RONANDERSON Ron Anderson

Telecommunications
AUTOTERM DL PROBLEM (IE ERROR)
JIMHARRISON Jim Harrison

Product Reviews & Announcement
THELDA PRODUCT ANNOUNCEMENT
OLDGROUCH Eric A. Wolf
HOME-PAC REVIEW
DESKMAN Bill Condie
CONNECTING COCO TO REAL WORLD
BILLBARDEN William Barden, Jr.

Laser Cycles

by Robert Rogers

Laser Cycles is an action-video game with color graphics and sound that works on all Color Computers. The scenario is simple. It is the year 2034 and two people are playing Laser Lines, a popular sport of the day. In Laser Lines two players must steer laser beams that move in one direction until the player changes its course. When one laser line collides with another (including its own line) or runs into an electro-wall that surrounds the playing field, that person's beam is terminated and the player loses.

Before the game begins, a kaleidoscopic title card appears. Then a ready, get set, go sequence starts the action. Initially the red and blue players' beams start at opposite sides of the screen and go toward each other. (Laser light travels at the speed of light. Hmm, maybe with POKE 65495,0 or POKE 65497,9 you can break the light barrier! Those with Co-Cos that can handle it should use it.) The joysticks control the directions of the beams. It takes practice to turn just when you want. As you play keep a couple of things in mind. First, don't back up onto your own line. (Don't move the stick down if the line is moving up or the other person will win.) Also, when different colored lines are drawn next to each other, the color of one line will sometimes change to the color of the other line. This is normal and won't affect play since the object of the game is to avoid hitting any colored line. When the game is over, the screen changes to the winning player's color and his score is displayed. The title card then reappears.

Some modifications can be made to the program. For Color BASIC, the line 345 SOUND 1,1 will add some noise and slow the game. Try it to see if you want this feature. For Extended BASIC, the lines 145 PLAY"T255;L255;O1" and 345 PLAY"C" add a noise that sounds neat and doesn't make the game too slow.

Laser Cycles is a simple game that also allows its players to develop strategies to corner other players while, at the same time, not being cornered by them. With this game you can experiment *and* have fun.

The Listing: LASER

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 '****************************
20 '*       LASER CYCLES       *
30 '*  COPYRIGHT  (C) 1985 BY  *
40 '*       ROBERT  ROGERS     *
50 '*  VERSION 1.1 JUNE 1986   *
60 '* FOR 4K COLOR BASIC COCOS *
70 '****************************
80 GOSUB390
90 CLS0:PRINT@228,"PRESS ANY KEY
 WHEN READY";
100 EXEC44539
110 X(1)=9:Y(1)=15:C(1)=3:Z(1)=1
:J(1)=2:K(1)=3
120 X(2)=54:Y(2)=15:C(2)=4:Z(2)=
2:J(2)=0:K(2)=1
130 CLS0:E=0
140 FORT=1TO10:B$=B$+CHR$(128):N
EXTT
150 Q=RND(8):IFQ=3 OR Q=4 THEN15
0
160 FORX=1TO62:SET(X,1,Q):SET(X,
30,Q):NEXTX
170 FORY=1TO30:SET(1,Y,Q):SET(62
,Y,Q):NEXTY
180 PRINT@235,"GET READY!";:SOUN
D125,20
190 PRINT@235,"GET SET!!!";:SOUN
D147,15
200 PRINT@235,"GO!!!!!!!!";:SOUN
D218,10
210 PRINT@235,B$;
220 FORT=1TO2
230 A=JOYSTK(J(T)):B=JOYSTK(K(T)
)
240 IFA<10 THEN Z(T)=1:GOTO280
250 IFA>53 THEN Z(T)=2:GOTO280
260 IFB<20 THEN Z(T)=3:GOTO280
270 IFB>43 THEN Z(T)=4:GOTO280
280 ONZ(T)GOTO290,300,310,320
290 X(T)=X(T)-1:GOTO330
300 X(T)=X(T)+1:GOTO330
310 Y(T)=Y(T)-1:GOTO330
320 Y(T)=Y(T)+1:GOTO330
330 IFPOINT(X(T),Y(T))<>0THENSOU
ND1,10:SET(X(T),Y(T),5):FORQ=1TO
1000:NEXTQ:GOTO490
340 SET(X(T),Y(T),C(T))
350 NEXTT
360 IFPEEK(345)=247THENSOUND230,
10:EXEC44539
370 E=E+1
380 GOTO220
390 A=1:B=63:C=1:D=31
400 CLS0
410 L=RND(4):FORX=A-1 TO B:SET(X
,C-1,L):NEXTX:B=B-1:A=A+1:SOUNDR
ND(255),1
420 FORY=C TO D:SET(B+1,Y,L):NEX
TY:D=D-1:C=C+1:SOUNDRND(255),1
430 IFC>17 THEN480
440 FORX=B TO A-1 STEP-1:SET(X,D
+1,L):NEXTX:B=B-1:A=A+1:SOUNDRND
(255),1
450 FORY=D TO C STEP-1:SET(A-2,Y
,L):NEXTY:C=C+1:D=D-1:SOUNDRND(2
55),1
460 IFC>17 THEN480
470 GOTO410
480 PRINT@266,"LASER CYCLES";:SO
UND200,6:PRINT@456,"BY ROBERT RO
GERS";:FORQ=1TO1000:NEXTQ:RETURN
490 IFT=1THENT=2:ELSET=1
500 CLS(C(T)):PRINT@224,"
  PLAYER"T"WON!"
510 FORS=1TO2:RESTORE:FORQ=1TO13
:READA,B:SOUNDA,B:NEXTQ:NEXTS
520 DATA 204,2,204,4,193,4,204,2
,204,4,193,4,185,2,193,2,197,2,1
93,4,185,2,193,4,176,4
530 Q=2048-E:Q=INT(Q*.1):E=E*10:
E=E+Q:PRINT@224," YOUR SCORE IS"
E"PLAYER"T
540 FORQ=1TO1000:NEXTQ
550 RUN
```

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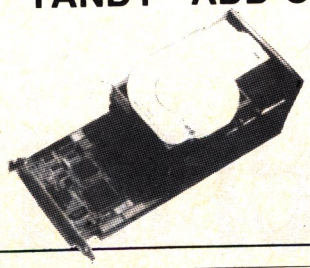

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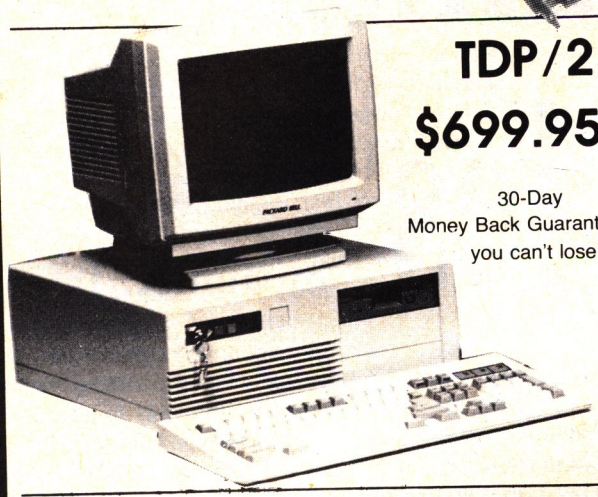

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Terminal Entries

Get a handle on some current communications programs

by Jim K. Issel

Having a computer is a lot like having a kid. When first you bring it home, you are delighted. You spend your time feeding and caring for it, but about all it does is make strange noises and "output" a lot of stuff you'd rather do without. As time passes the care and feeding get easier, and the output becomes more meaningful. Soon it outgrows the little corner of your bedroom it originally occupied and wants a room of its own. It needs space for all the toys it has accumulated (some of which are gathering dust in the corner). Just when you get that taken care of and think everything is going well, the darn thing becomes a teenager and wants its own phone!

As you and your computer begin to make computer buddies at remote sites, you are drawn inexorably into the realm of telecommunications. To establish residency in this strange and mystic world, you will need three new components for your computer system: a modem, a phone line and a data-communications or terminal program. You will also need extensive vocabulary additions to accomodate buzz words such as *baud rate*, *parity*, *duplex*, *carrier*, ad infinitum. In this article I assume your familiarity with the most basic of these terms and concentrate on looking at a number of terminal programs that run under Disk BASIC: *Delphiterm*, *MikeyTerm*, *Ultimaterm*, and *V-Term*.

In playing with these programs, I used a CoCo 3 with 128K, dual disk drives, an RS-232 Pak, monochrome monitor and a Multi-Pak Interface. I experimented with them on three different remote systems over a period of several weeks. I also chatted with a number of terrific people on Delphi and solicited their opinions. I have found over the years that when it comes to word processors, whatever program people learn first is the one they like best forever. I did not find this to be the case with terminal programs. Most of the people with whom I talked have switched at least once, and some even use different programs for different tasks.

Perhaps the explanation for this is that all of these programs are entirely first-rate. Each supplies the basic capabilities necessary for telecommunication, along with its own additional touches and personality. Some are designed to accommodate specific needs, such as *Delphiterm*'s obvious slant toward Delphi parties, while others are more generic. All of them, though, are well-designed, function smoothly, and are refreshingly free of self-indulgent hype. None claims to be perfect for all users under all circumstances, and all invite feedback and suggestions. This is my kind of atmosphere!

MikeyTerm

MikeyTerm, written by Mike Ward, was actually the first data-communications package I used. Although *MikeyTerm* has gone through some revisions since then, it retains its original flavor, providing solid functionality in an easy to use package. To begin, there is a separate configuration program that is fairly clear and simple. This enables you to do things such as set the display mode and only needs to be run once.

There were a couple of prompts in the

Jim Issel is a software support manager and teaches computer classes at a local community college. He, his wife Debbie, and son, Jason, live in Cotati, California.

configuration process that I didn't immediately understand. And having stupidly misplaced my updated *MikeyTerm* documentation, I gave some inappropriate responses. The result was a minor loss of functionality — minor in that I failed to figure out which functions I had disabled and didn't miss them. From this you may correctly infer that *MikeyTerm* is delightfully easy to decipher. Access to most features is gained by using the CTRL key in combination with the numeric keys. File transfers, buffer manipulation and baud rate changes are all available in this manner. In addition CTRL-7 displays a menu that provides access to additional commands.

Buffer manipulation is the ability to capture incoming data in the computer's main storage area. This ability is smoothly implemented in *MikeyTerm*, although there are fewer buffer features as in some other packages. The capture feature is easily toggled on and off. The contents of the buffer can be viewed, cleared, saved to disk or sent to the remote system. Another useful capability in *MikeyTerm* is the option to view the buffer one line at a time or one screen at a time. I did not notice a command to print the buffer, but this may have been one of the things I inadvertently turned off.

File transfers between your CoCo and the remote machine are easily initiated and run without difficulty. The only protocol available is Xmodem. I have not found a remote system that fails to support Xmodem. I don't find this limitation troublesome since some of the BBSs I frequent support only Xmodem. I made several file transfers in both directions and encountered few problems.

The 80-column screen display is new since I last used *MikeyTerm*. On my monochrome monitor, the display is crisp and clear. When you are not using any of the control key commands and have the program in the *terminal mode*, *MikeyTerm* displays only the data being transmitted back and forth. There are no onscreen status lines or copyright messages.

In complete fairness to *MikeyTerm*, I should have downloaded the documentation again and scoured it for anything I had missed. For example, I found no evidence of macro capabilities or scripting. I had enormous amounts of fun exploring it blindly and had satisfying results. As I remembered from the earlier version, *MikeyTerm* is intuitive, clear and entirely adequate for most telecommunication needs. If you are in need of a program that emulates a specific type of terminal, such as a 3270 or a VT-52, you'll have to look further. Otherwise *MikeyTerm* will get you going.

Delphiterm

Delphiterm, written by Rick Adams, is a terminal program designed to facilitate connection to Delphi. Ignore the limitations suggested by its name. *Delphiterm* is a versatile package and well-suited for connection to most remote systems.

Delphiterm is a machine-language program. It also includes a BASIC driver that establishes a number of parameters, such as baud rate, screen colors and default disk drives. The documentation clearly describes all the parameters, which are initialized to appropriate settings for Delphi access.

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Paul K. Ward February '90 Rainbow Review

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D. Laramie Clinton County CoCo Club

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Delphiterm provides a broad array of features, all of which are thoroughly described in the manual. File transfers can be made using either Xmodem or Ymodem protocols. An innovative touch is *Delphiterm*'s file-transfer alarm, which causes the terminal to beep when a transfer is complete. Again I had no problems with file transfers in either direction.

Delphiterm has the most impressive set of buffer manipulation commands I have ever seen. You can toggle the buffer on and off to capture incoming data. You can load a disk file into the buffer or save the buffer contents to disk. It can be viewed, printed, deleted and even edited without disrupting your remote session. You can enter text into the buffer directly from the keyboard. You can send it to the remote system. You can even mark a section of the text and send, print or save only the block that is marked. I found this feature especially useful. With this marking feature, I can capture an on-going session in the buffer and still print only a particular section.

A *macro* is a method of sending a potentially long string of data or commands with a small number of keystrokes. The macro capabilities of *Delphiterm* are unique and useful. To use macros in *Delphiterm* you need to create a separate text file on disk called MACROS.TXT. When the program starts, this file is read into a macro buffer, which is different from the capture buffer discussed above. Once loaded, the macro buffer cannot be edited.

Rather than referencing macros using predetermined keys, such as the function keys or certain control keys, *Delphiterm* allows you to name each macro that is to be used. By initiating the Send Macro command, you can send your macros by name. Examples in the manual illustrate how this feature can be used while in Delphi conference, when several people are electronically chatting together. Macros can be given names such as LAUGHTER or EMERGENCY (large quantities of coffee will cause these) and sent quickly and easily at the appropriate times.

In addition to the named macros, the ALT-0 through ALT-9 keys along with the two function keys can be used to send macros. These keys can be programmed to include a number of special characters, such as carriage return, ALT, and wait for response. This feature allows for some additional functionality of the keyboard. You can program these keys to do things such as carry out your entire dialing and logging on procedure. To complete the macro capabilities, four macro names are reserved for use with the joystick buttons. This will at least temporarily emancipate you from the keyboard.

Other *Delphiterm* commands allow you to toggle the line feed mode, change the baud rate, enter conference mode, and display a help screen that lists all the available commands. Conference mode adds an additional line to the screen. In this highlighted line, all of your data is visible until the information is transmitted with the ENTER key. It is extremely helpful not to have your typing interspersed with incoming conversation from other users while chatting on Delphi conference.

For CoCos with 512K, *Delphiterm* also provides two RAM disks. I tried this feature on a borrowed 512K machine and was very happy with the results. It is certainly different doing disk operations at the speed of RAM!

From a user's perspective, *Delphiterm* is a marvelous and flexible program. I particularly like the enhanced buffer commands. The program is very easy to operate. Although my overall impression is favorable, there were a couple of things that left me less than delighted. The most significant of these is the screen display. The screen is designed for use with an RGB monitor. With my monochrome monitor, the display is rather fuzzy and gets hard on my old eyes after extensive use. My other complaint is a minor one. Although I am completely at home with BASIC, I prefer using a configuration program to modify lines of code in a BASIC loader. I have friends with CoCos who do not program. I am sure this procedure would be nerve-racking, if not difficult, for them.

Ultimaterm

Ultimaterm, written by Ken Johnston, is a program with a wide following. It is the terminal program of choice among many of the people I questioned. The reasons are obvious once you work with it. *Ultimaterm* supports a broad assortment of features, including several terminal emulation modes.

During your initial *Ultimaterm* session, there are several definable parameters worthy of study. The options menus allow you to define settings for your disk drive, modem, keyboard, printer, screen display and programmable macro keys. The chapter in the manual that describes the initial setup is 11 pages long! Most of these are preset at the most common values. If you try to be macho and plunge ahead without looking at them, you may end up, as I did initially, with an apparently nonfunctioning program. I had my RS-232 Pak in Slot 2 of the Multi-Pak Interface, while the programmed default is for Slot 1.

Disk parameters include the default drive for saving or loading files, a verify function, and the stepping rate. Definable modem settings cover duplex, baud rate, RS-232 Pak usage and terminal type. Printer options allow you to indicate the baud rate and a printer line delay if you are using an older printer that needs to be reset after each line printed.

There are 10 macro keys, accessed with the CTRL and numeric keys. When you define one of these to hold a string of text, that string is sent to the remote system by entering that macro key. In addition, the function keys can be programmed with command strings. The difference is that the CTRL and numeric keys cause text to be sent while the function keys are interpreted as commands to *Ultimaterm*. The default function key settings enable you to make file transfers with a single keystroke.

Other options available in *Ultimaterm* allow you to set the key repeat rate, turn key-click on and off, toggle the display mode between monochrome and color, and enable upper- and lowercase. Once the parameters are set, a save command stores them so that *Ultimaterm* will always start with those settings.

Many of *Ultimaterm*'s features are similar to those discussed above. The buffer can be saved to, or loaded from, disk. It can also be transmitted, displayed or printed. Conference mode is available, and file transfers can be accomplished using Xmodem, Ymodem, or Xmodem/CRC protocols. There is also a very useful screen-print function.

The ability to emulate the functioning of specific types of terminals, including VT-100 and VT-52, is one capability of *Ultimaterm* that is not offered in *Delphiterm* or *MikeyTerm*. This is a very handy capability to have when logging onto a system that expects a certain terminal type. The difficulty in using a specific terminal emulation mode is in accessing all of the characters, like curly braces and circumflexes, not found on a CoCo keyboard. The *Ultimaterm* documentation does a good job of describing each mode's use.

Even though I was very impressed with the extensive set of features offered by *Ultimaterm* and the clear, thorough manual, I did have a few disconcerting problems with the program. Access to most of the commands is attained by use of pop-up menus, which appear in the center of the screen. If the screen is already full, the menus can be difficult to see. As a less than ideal typist, I would inadvertently bring up a menu and wonder why none of my subsequent keystrokes had the desired effect.

I also had difficulty with the VT-100 emulation mode. At work I have remote access to the Unix system that regularly handles VT-100 terminals for word processing and such. With *Ultimaterm*, I had so many problems using the Unix editor in VT-100 mode that I finally gave up.

V-Term

V-Term, written by Tim Koonce and licensed to Gimmesoft, is my favorite program of this bunch. *V-Term* offers several terminal emulation modes, solid functionality, extensive documentation, and it's easy to use.

V-Term may simply appeal to my lizard brain. When I first loaded it, the screen display was so exceptionally clear and sharp that I found myself saying silly things like "Ooohh!" At the bottom of the display, an inverse video command window provides access to all of the program's features by using a hierarchical interface reminiscent of *Lotus 1-2-3*. By holding down the ALT key and entering the first, or sometimes the capitalized, letter of the desired command, you change the command window to show the available suboptions for that command. It also allows text entry when appropriate, such as to specify a filename. With some general understanding of telecommunications, it is possible to use *V-Term* just by perusing the onscreen commands for a short time.

V-Term offers file transfers via Xmodem, Ymodem, and Xmodem/CRC. I had no problem with transfers in both directions. Buffer commands do not include editing or marking capability. Displaying, loading, saving, and clearing the buffer can be done, though, on an alternate screen without disruption to ongoing communication. You can also set up multiple buffers with different names and treat each independently.

V-Term's terminal emulation modes function well. I am happily editing on our Unix system even as I type. Configuring *V-Term* is simply a matter of modifying the parameter within the command menu, then using the Save Parameter command.

The *V-Term* manual is excellent. At the beginning is a thorough explanation of basic data communication concepts, followed by a summary of all of the program's menus as they appear on the screen. There is also a comprehensive discussion of the commands and features, including the various terminal emulation modes.

Despite the above praise of *V-Term*, I do find fault with the program. On start-up, the program tells you it is loading the default parameter file. This happens whether or not such a file is found. This message does not disappear from the screen until you press a key. Once you are used to it, this is no longer a problem. The file has finished loading when the disk stops spinning. Sometimes programs read more than one file from disk. When I first started using *V-Term*, I was never sure when it had finished loading files.

Another problem is that upon exiting the program my computer is frozen, which means I have to turn it off and on again. I tried several configurations of my equipment and could not alleviate the problem.

In VT-100 mode, I often type an *i* and get an *e* instead. Occasionally, I get an *i* when I press the *t*. I'm not sure what causes this intermittent behavior, but it is a condition peculiar to *V-Term*.

The lack of macros is my only other complaint with *V-Term*. Since I use a dumb terminal for telecommunication, I have never gotten into the habit of using macros extensively. In otherwise comprehensive packages, this is a noticeable omission.

What conclusions can be drawn from all of this? Well, there are some excellent programmers out there writing superlative software for our Color Computers. I did no timing test or feature-by-feature comparisons between these programs. Each of these programs is functionally smooth, and designed to fill gaps left by others. If you are new to telecommunications, you can start quickly with *MikeyTerm*. Delphi party animals will appreciate *Delphiterm*. Power macro users are likely to enjoy *Ultimaterm*. And if Unix connectivity is what you need, then try *V-Term*. Choose one, log onto Delphi, and let me know how you like it.

For More Information . . .

V-Term is available for $39.95 from Gimmesoft. Write or call:

Gimmesoft
P.O. Box 421
Perry Hall, MD 21128
(301) 256-7558

MikeyTerm is available on Delphi and CompuServe. It can also be obtained by sending $10, a blank disk or tape and a reusable mailer to:

Mike Ward
1807 Cortez
Coral Gables, FL 33134

Delphiterm can be downloaded from the CoCo SIG on Delphi or obtained by sending $10, a disk and a mailer to:

Rick Adams
702 Monroe Street
Santa Rosa, CA 95404

Ultimaterm is available on Delphi and CompuServe, or from the author as shareware (registration fee $25). Write to:

Ken Johnston
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CoCo Tours the States

by Fred B. Scerbo
Contributing Editor

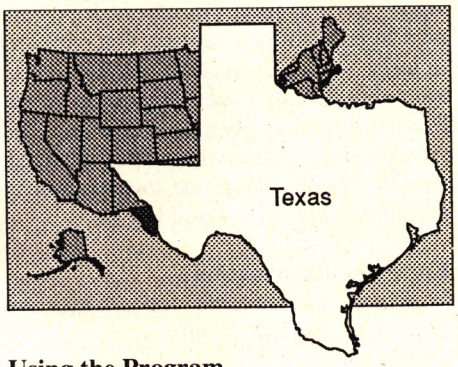
If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Recently I sat with my fiance and discussed where we could go for our honeymoon. (By the time you read this, we will have returned.) We looked at a map of the continental United States to plot our route.

All this planning over the map was the source of this month's Wishing Well idea. *Fifty States* is the latest installment in our series of educational programs using the *Opposites* shell. Using a whole new set of graphics data, we have expanded this shell to just about the outside limit of its storage capacity.

The original *Opposites* program was designed to hold 20 sets of graphics images (two each for a total of 40). With *Fifty States*, we push this shell to a maximum of 50 sets, for a total of 100 graphics images.

In order to get all 50 states into one program, without breaking it into two parts, it was necessary to create this graphics data with an absolute minimum of commands. The DRAW command can be very efficient, but if you follow the original CoCo handbook and use semi-colons between drawing directions, your program will be too long. Many of us abandoned the use of semi-colons years ago. For newcomers, though, it probably doesn't hurt to restate this fact.



Using the Program

Fifty States was designed to help students recognize the appearance of our 50 states. Recent polls have shown that geography is an area of weakness for many American students. This program allows students to brush-up on these skills, and is a good way for young CoCo users to get an early grasp of geography.

The program works like all others in this series. I won't bore regular readers with the same explanation I usually include. Suffice it to say that Choice A lets the user review all 50 map shapes and names simply by pressing the ENTER key.

Choices B and C ask you to match a map with a state name, from the list of state names that accompany each map, simply by pressing the space bar and ENTER key.

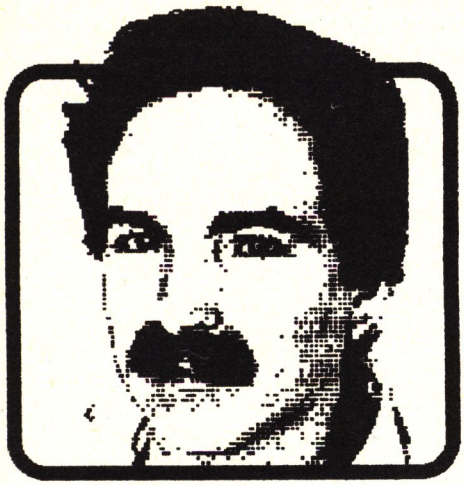
32K Extended

```
25 ..... 89
50 ..... 190
75 ..... 14
125 ..... 216
170 ..... 112
230 ..... 127
280 ..... 212
305 ..... 138
345 ..... 239
1020 ..... 39
1070 ..... 240
1140 ..... 56
1200 ..... 170
1260 ..... 97
1320 ..... 246
1400 ..... 82
1490 ..... 123
1550 ..... 190
1590 ..... 94
1650 ..... 217
1710 ..... 53
1780 ..... 62
1830 ..... 4
1900 ..... 242
1950 ..... 237
2010 ..... 88
2080 ..... 1
2130 ..... 63
2190 ..... 150
2250 ..... 15
2330 ..... 78
2390 ..... 223
2430 ..... 231
2490 ..... 207
END ..... 197
```

The Listing: STATES

```
1 REM*****************************
2 REM*     THE FIFTY STATES      *
3 REM*   COPYRIGHT (C) 1990      *
4 REM*     BY FRED B. SCERBO     *
5 REM*     60 HARDING AVENUE     *
6 REM*  NORTH ADAMS, MA 01247    *
7 REM*****************************
10 CLEAR3000
15 CLS0:PRINTSTRING$(32,188);STR
ING$(32,204);:FORI=1TO128:READA:
PRINTCHR$(A+128);:NEXT
20 PRINTSTRING$(32,195);STRING$(
32,179);
25 DATA126,124,124,124,120,113,1
24,124,124,114,48,53,60,60,56,62
,61,60,58,62,60,60,58,62,61,60,5
8,62,60,53,60,60
30 DATA123,115,115,115,,117,,,11
2,122,48,53,51,51,50,56,53,,56,5
9,51,51,58,56,53,,56,59,51,53,51
```

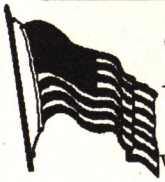
Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.



Pyramix

This is a fascinating CoCo 3 game of skill and coordination. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of ColorVenture. **Disk: $19.95**

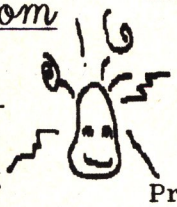
The Freedom Series



Vocal Freedom

Vocal Freedom turns your computer into a digital voice recorder. The optional Hacker's Pac lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the prerecorded message directly from its Random Access Memory with amazing fidelity! You may also SAVE or LOAD sounds to and from DISK. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone. Will run on a CoCo 1, 2, or 3. Vocal Freedom **Disk: $34.95.** Optional Hacker's Pac **Disk: $19.95. Disk for both: $49.95**

Mental Freedom



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VDOS the UnDisk

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Pressing @ allows you to check your score during the quiz, while pressing C allows you to continue from the menu.

Making Things Easier

You will find that the data required to generate all 50 states takes up quite a bit of space for this program. For those of you who will be entering this by hand, I have arranged the DATA statements so they will be identical to those needed for next month's program, which will be a revised *Match Game* shell designed to hold these expanded DATA statements. Even the numbering will be the same, which should save some of you a great deal of typing time.

Conclusion

In any case, I think you will find both this program and next month's listing are valuable additions to your software library. Both are fun and educational.

Perhaps next month I will be able to tell you how many states my bride and I went through on our honeymoon. ❑

```
,51
35 DATA,,,112,122,117,,,112,122,
,48,,,58,,53,,,58,,48,58,,53,,,5
8,,,53
40 DATA121,115,115,115,120,116,1
15,115,115,120,48,49,51,51,58,,5
5,50,,59,48,49,58,,55,50,,59,51,
49,51,55
45 PRINT@358," AN INTRODUCTION T
O  ";:PRINT@390,"  THE FIFTY STA
TES   ";
50 PRINT@422,"  BY FRED B.SCERBO
   ";:PRINT@454," COPYRIGHT (C)
1990  ";
55 X$=INKEY$:IFX$<>CHR$(13)THEN5
5
60 DIM P$(50,2),A$(6),B$(50),C$(
50),A(50),N(50),B(4),C(4),D(4),E
(4),F(4),AO(50)
65 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO50:READP$(I,1),P$(I,
2):NEXT
70 COLOR1,0
75 CLS:PRINT:PRINTSTRING$(32,"="
);:PRINT@102,"AN INTRODUCTION TO
":PRINT@135,"THE FIFTY STATES":P
RINT@199,"A) REVIEW STATES":PRIN
T@263,"B) QUIZ STATES":PRINT@327
,"C) QUIZ NAMES"
80 PRINT@388,"<<<SELECT YOUR CHO
ICE>>>"
85 PRINT:PRINTSTRING$(32,"=");
90 X$=INKEY$:X=RND(-TIMER):IFX$=
"A"THEN345ELSEIFX$="B"THEN95ELSE
IFX$="C"THEN2500ELSE90
95 CLS0:PMODE0,1:PCLS1
100 LINE(0,0)-(254,170),PRESET,B
105 LINE(6,4)-(122,82),PRESET,BF
110 LINE(128,4)-(248,82),PRESET,
B
115 LINE(6,86)-(122,164),PRESET,
B
120 LINE(128,86)-(248,164),PRESE
T,B
125 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10"
126 DATA"R10D4NL10D6BR6U10R10D4L
10R4F6BR6E4U2H4"
130 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
135 PAINT(2,2),0,0:PCOPY1TO3
140 PMODE0,4:PCLS1
145 LINE(0,0)-(254,170),PRESET,B
F
150 LINE(8,6)-(120,80),PSET,BF
155 PCOPY4TO2:PMODE0,1:SCREEN1,1
160 DATA"S4BM4,8C1","S4BM130,8C0
","S4BM4,90C0","S4BM130,90C0","S
4BM4,48C0","S4BM130,48C0"
165 FORI=1TO50
170 A(I)=RND(50):IFN(A(I))=1THEN
170
175 N(A(I))=1:NEXTI:FORY=1TO50:C
OLOR1,0
180 FORI=2TO4
185 B(I)=RND(3)+1:IFN(B(I))=0THE
N185
190 N(B(I))=0:NEXTI:FORI=1TO4:N(
I)=1:NEXT
195 B=RND(50):IFB=A((Y))THEN195
200 C=RND(50):IFC=B OR C=A((Y))T
HEN200
205 DRAW A$(1):DRAWP$(A(Y),1)
210 DRAW A$(B(2)):DRAWP$(B,2)
215 DRAW A$(B(3)):DRAWP$(C,2)
220 DRAW A$(B(4)):DRAWP$(A(Y),2)
225 COLOR1,0
230 Z=0
235 PMODE0,4
240 DRAW A$(1)+"C0":DRAWP$(A(Y),
1)
245 DRAW A$(B(2))+"C1":DRAWP$(B,
2)
250 DRAW A$(B(3))+"C1":DRAWP$(C,
2)
255 DRAW A$(B(4))+"C1":DRAWP$(A(
Y),2)
260 PMODE0,1:SCREEN1,1
265 LINE(8,6)-(120,80),PSET,B
270 X$=INKEY$:IFX$=" "THEN280ELS
EIFX$="@"THEN2520
275 COLOR1,0:LINE(8,6)-(120,80),
PRESET,B:GOTO265
280 Z=Z+1:IFZ=4THENZ=1
285 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
290 X$=INKEY$:IFX$=" "THEN280ELS
EIFX$=CHR$(13)THEN300ELSEIFX$="@
"THEN2520
295 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO285
300 IFZ+1=B(4)THEN310
305 NW=NW+1:FORK=1TO5:PMODE0,4:S
CREEN1,1:SOUND10,3:PMODE0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO285
310 NC=NC+1:PMODE0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
315 DRAW A$(5):DRAWP$(A(Y),1)
320 DRAW A$(6):DRAWP$(A(Y),2)
325 SCREEN1,1
330 X$=INKEY$:IFX$<>CHR$(13)THEN
330
335 PMODE0,1
340 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO2520
345 PMODE0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
350 FORI=1TO50:DRAW A$(5):DRAWP$
(I,1)
355 DRAW A$(6):DRAWP$(I,2)
360 X$=INKEY$:IFX$<>CHR$(13)THEN
360
365 COLOR1,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
370 RUN
1000 REM ALABAMA
1010 DATA"BR40BD60U20M+4,-30R30M
+4,+40LD6L26D6L10"
1020 DATA"BR12BD40U12R8D6NL8D6BR
6NU12R6BR6U12R8D6NL8D6BR6R2U12NL
2R8D6NL8D6NL8BR6U12R8D6NL8D6BR6U
12R6ND12R6D12BR6U12R8D6NL8D6"
1030 REM ALASKA
1040 DATA"BR14BD64NU2R6U4NL6BR6N
U2R6U4NL6BR6NU2R6U4NL6BR6E6U2L12
H6U6E2R6E2U2H2L4U4E2R4F2E4H4U4R1
2U2R16D2R12D38R4F6R4F10D4L4H10L4
H6L6H6L8M-16,+10H2"
1050 DATA"BR22BD40U12R8D6NL8D6BR
6NU12R6BR6U12R8D6NL8D6BR6R8U6L8U
6R8BD12BR6U12D6R4NE6F6BR6U12R8D6
NL8D6"
1060 REM ARIZONA
1070 DATA"BR34BD50M+30,+12R22U54
L40D8L6G4D8F4G4D4F4G6"
1080 DATA"BR18BD40U12R8D6NL8D6BR
6U12R8D6L8R2F6BR6NU12BR6NR8M+8,-
12NL8BD12BR6U12R8D12NL8BR6U12M+8
,+12NU12BR6U12R8D6NL6D6"
1090 REM ARKANSAS
1100 DATA"BR34BD50F4R4D6R40U8M+1
0,-38L6U4L56M+4,+40
1110 DATA"BR8BD40U12R8D6NL8D6BR6
U12R8D6L8R2F6BR6U12D6R2NE6F6BR6U
12R8D6NL8D6BR6U12M+6,+12NU12BR6R
8U6L8U6R8BD12BR6U12R8D6NL8D6BR6R
8U6L8U6R8"
1120 REM CALIFORNIA
1130 DATA"BR68BD70NR22U6H10L4H10
U4H4R4U4L4H6U10H4E4U8R30D26F28D6
F2G2D6"
1140 DATA"BR14BD40L6U12R6BD12BR4
U12R8D6NL8D6BR6NU12R4BR6NU12BR4U
6NR6U6R8BD12BR4U12R6D12NL6BR6U12
R8D6L8R2F6BR6U12M+6,+12NU12BR6NU
12BR6U12R8D6NL8D6"
1150 REM COLORADO
1160 DATA"BR32BD52R60U40L60D40BE
26E4R6F4"
1170 DATA"BR14BD40L6U12R6BD12BR6
U12R8D12NL8BR6NU12R6BR6U12R8D12N
L8BR6U12R8D6L8R2F6BR6U12R8D6NL8D
6BR6R2U12L2R10D12NL8BR6U12R8D12L
8"
1180 REM CONNECTICUT
1190 DATA"BR28BD62M+20,-8R28E4R2
0E4U30L68D30F4M-16,+6D6R2"
1200 DATA"BR12BD40L6U12R6BD12BR4
U12R6D12NL6BR4U12M+8,+12NU12BR4U
12M+8,+12NU12BR4NR4U6NR4U6R4BD12
BR4NR6U12R6BR4R4ND12R4BR4D12BR4N
R6U12R6BR4D12R6U12BR4R4ND12R4"
1210 REM DELAWARE
```

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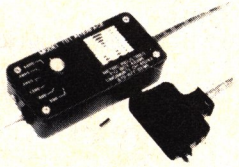
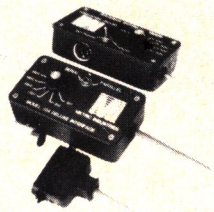
1220 DATA"BR44BD62NR30U50E8R8F2D
4G6D12F6M+10,+26"
1230 DATA"BR6BD40R2NU12R8U12NL10
BR6NR6D6NR6D6R6BR6NU12R6BR6U12R8
D6NL8D6BR6NU12R6NU12R6NU12BR6U12
R8D6NL8D6BR6U12R8D6L8R2F6BR6NR6U
6NR6U6R6"
1240 REM FLORIDA
1250 DATA"BR20BD8R28F4R26F2R4U6R
10D10M+18,+30D16G4L12H8U4M-16,-9
U6E2U4H12L8G6L6H10L10U4H2U2"
1260 DATA"BR16BD40U6NR8U6R8BR6D1
2R6BR6U12R8D12NL8BR6U12R8D6L8R2F
6BR6U12BR6R2ND12R8D12NL10BR6U12R
8D6NL8D6"
1270 REM GEORGIA
1280 DATA"BR40BD56U20M-8,-30R36G
2F30D6L2D8F2D4L10D6L4U4L36H6"
1290 DATA"BR16BD40NR8U12R8BD6NL4
D6BR6NR8U6NR8U6R8BR6ND12R8D12NL8
BR6U12R8D6L8R2F6BR6NR8U12R8BD6NL
4D6BR6NU12BR6U12R8D6NL8D6"
1300 REM HAWAII
1310 DATA"BR12BD16NU4R6U4NL4BR8F
4R6E2U4H2L6G4D2BR16BD6R4E4R4F6D4
L12NH4BR20E2R8F2G2L8NH2BD6R4D4L4
U4BR10E4R4F4R6D4L12H4BD14BR8D4G4
D4R2D4F4R4E8R4E4U4H4L4H2L10"
1320 DATA"BR22BD40U12D6R8U6D12BR
6U12R8D6NL8D6BR6NU12R8NU12R8NU12
BR6U12R8D6NL8D6BR8NU12BR8NU12"
1330 REM IDAHO
1340 DATA"BR44BD60R40U20L10U2H4U
2L4M-8,-22U6L12D30F4G8F2D10"
1350 DATA"BR28BD40NU12BR8R2U12L2
R10D12NL8BR6U12R8D6NL8D6BR6U12D6
R8U6D12BR6U12R8D12L8"
1360 REM ILLINOIS
1370 DATA"BR46BD6R30D6F2D30G2D4G
2D4G2L4D2F4D2L8H2L4G2L2H4U6H10U4
E2U2H6U2E6U4R6E4U4H4"
1380 DATA"BR16BD40NU12BR8NU12R6B
R6NU12R6BR8NU12BR8U12M+8,+12U12B
R6ND12R8D12NL8BR8NU12BR8R8U6L8U6
R8"
1390 REM INDIANA
1400 DATA"BR46BD8ND30R36D36F2D2G
6L4G8L2G4L4H4L2G6L2H4U6E2U4E4U8"
1410 DATA"BR16BD40NU12BR8U12M+8,
+12U12BR6R2ND12R8D12NL10BR8NU12B
R8U12R8D6NL8D6BR6U12M+8,+12NU12B
R6U12R8D6NL8D6"
1420 REM IOWA
1430 DATA"BR40BD18R42D2F4D4F6D6G
2L4D4G4D4L4H2L30H2U4H4U4H6U4E2U2
H6R8"
1440 DATA"BR32BD40NU12BR8U12R8D1
2NL8BR6NU12R6NU12R6NU12BR6U12R8D
6NL8D6"
1450 REM KANSAS
1460 DATA"BR32BD18R52D2F4D4F4D20
L60U32"
1470 DATA"BR20BD40U12D6R2NE6F6BR
6U12R8D6NL8D6BR6U12M+6,+12NU12BR
6R8U6L8U6R8BD12BR6U12R8D6NL8D6BR
6R8U6L8U6R8"
1480 REM KENTUCKY
1490 DATA"BR18BD48R80E4R2E4U2E4H
4L2H4U4H4L2G2L4H6L4U2L8D4G4L4G4L
8G4L4H4L4G8L4G4D2L4D4L4D6L2R8"
1500 DATA"BR10BD40U12D6R2NE6F6BR
6NR8U6NR8U6R8BR6ND12M+8,+12U12BR
4R4ND12R4BR4D12R8U12BR6NR8D12R8B
R6U12D6R2NF6E6BR6D2F4ND6E4NU2"
1510 REM LOUISIANA
1520 DATA"BR28BD10R40F4D2F4D2G4L
G8D6R26D4G2D2F4L10G2F2R8G4F4DL8H
6L4D6L8H4G4L2H2L2H6L8H2L8U6E2U6E
6U2H6U16
1530 DATA"BR10BD40NU12R6BR6U12R8
D12NL7BR6NU12R8NU12BR6NU12BR6R6U
6L6U6R6BR6D12BR6U12R8D6NL8D6BR6U
12M+8,+12U12BR6ND12R8D6NL8D6"
1540 REM MASSACHUSETTS
1550 DATA"BR24BD20R50E4R2E4R8F6D
4G6L4D4F8R2D6R10E2U6H4U4R6F4D16M
-22,+8U6L4G6L6H10U4L28D4L4U4L18H
2M+8,-22"
1560 DATA"BR8BD40U12R4ND12R4D12B
R4U12R4D6NL4D6BR4R4U6L4U6R4BR4NR
4D6R4D6NL4BR4U12R4D6NL4D6BR4NR4U
12R4BR4D12U6R4U6D12BR4NU12R4NU12
BR4R4U6L4U6R4BD12BR4NR2U6NR2U6R2
BR4R2ND12R2BR4R2ND12R2BR4NR4D6R4
D6L4"
1570 REM MARYLAND
1580 DATA"BR24BD20R70D24R12D8L4D
2L10H6U4H6U8E4U2L8D2G6D8F6D4L6H1
0U6H2L4H2U4L6G2L6U4L2G6L6U8"
1590 DATA"BR6BD40U12R6ND12R6D12B
R6U12R8D6NL8D6BR6U12R8D6L8R2F6BR
4BU12D2F4ND6E4U2BR6D12R6BR6U12R8
D6NL8D6BR6U12M+8,+12NU12BR4R2NU1
2R8U12L10"
1600 REM MAINE
1610 DATA"BR34BD36ND30R4E4U4E2M+
6,-20E4R6F6R8F6D20R4F2D6R4F4G6L8
G4L6G2L6G4L10G8H4"
1620 DATA"BR26BD40U12R6ND12R6D12
BR6U12R8D6NL8D6BR6NU12BR6U12M+8,
+12U12BR6NR8D6NR8D6R8"
1630 REM MICHIGAN
1640 DATA"BR48BD68R40M+12,-22U10
H2L8G6L4H2U4E4U4E2U4H2L4H6L4G6L2
G6L2G4D8F2D6F2D2F4D2G2D4G6BU58L6
H4L6U2E2L4G4L2G6D2R8F4R8F2E4R8E4
R10U4L6H2L6G4"
1650 DATA"BR12BD40U12R6ND12R6D12
BR6NU12BR6NR8U12R8BR6D12U6R8U6D1
2BR6NU12BR6NR8U12R8BD6NL4D6BR6U1
2R8D6NL8D6BR6U12M+8,+12U12"
1660 REM MINNESOTA
1670 DATA"BR40BD64R50U8H8L4U6H4U
2E4U8E8R2E2R4E2U4L8H2L4G2L4H2L10
G4L10H4L2U2L14D8F2D6F2D12F2D28R2
"
1680 DATA"BR6BD40U12R6ND12R6D12B
R6NU12BR6U12M+8,+12NU12BR6U12M+8
,+12U12BR6NR6D6NR6D6R6BR6R6U6L6U
6R6BR6D12R6U12NL6BR4R4ND12R4BR4N
D12R6D6NL6D6"
1690 REM MISSISSIPPI
1700 DATA"BR40BD60R22D4F4R6E2R6F
2R2U64H2L26G6D2G6D6G4D6F4D4G2D4G
2D4G2D6"
1710 DATA"BR6BD40U12R6ND12R6D12B
R6NU12BR6R6U6L6U6R6BR4NR6D6R6D6N
L6BR6NU12BR6R6U6L6U6R6BR4NR6D6R6
D6NL6BR6NU12BR6U12R6D6NL6BR6ND6U
6R6D6NL6BR6U6D12"
1720 REM MISSOURI
1730 DATA"BR36BD60R54F4G4R12U12H
4U4H6U6E4U4H4L2H10U4H2U4L54F4D4F
4D8F4D32"
1740 DATA"BR14BD40U12R6ND12R6D12
BR6NU12BR6R8U6L8U6R8BR4NR8D6R8D6
NL8BR6U12R8D12NL8BR6NU12R8NU12BR
6U12R8D6L8R2F6BR6U12"
1750 REM MONTANA
1760 DATA"BR16BD14R92D38L50D6L4U
2L6G2L2H4L4U8L2G4L4U8H6U6H6U10"
1770 DATA"BR14BD40U12R6ND12R6D12
BR6U12R8D12NL8BR6U12M+8,+12U12BR
4R4ND12R4BR4ND12R8D6NL8D6BR6U12M
+8,+12U12BR6ND12R8D6NL8D6"
1780 REM N CAROLINA
1790 DATA"BR36BD18R72D4G2L4D4R8D
4G2L12F4R2D4G4L2G6L8H8L12H8L14G2
L28U2E4R4E6R4E8"
1800 DATA"BR12BD50NR8U12R8BR6ND1
2R8D6NL8D6BR6U12R8D6L8R2F6BR6U12
R8D12NL8BR6NU12R6BR6NU12BR6U12M+
8,+12U12BR6ND12R8D6NL8D6BU18BL18
```

Model 101 $37.95 (101P $43.45)
Serial to Parallel Printer Interface

- ★ Works with any COCO
- ★ Compatible with "Centronics" Parallel Input Printers
- ★ Just turn the knob to select any one of 6 baud rates 300-9600
- ★ Comes complete with cables to connect to your printer and computer
- ★ Can be powered by most printers



Model 104 $46.95 (104P $53.95)
with "Modem Switch"

- ★ **Same features as 101 Plus**
- ★ Built in Serial Port for your Modem or other serial device
- ★ Switch between Serial Output and Parallel Output

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Some of the Printers That Can –
Supply power for the 101 and 104 are Radio Shack, Star, Okidala, Brother, Juki, and Smith Corona.

Some of the Printers That Cannot –
Supply power for the interfaces are Epson, Seikosha, Panasonic, Silver Reed and NEC. If your printer cannot supply power to the interface you can order your interface with the "P" option or you can supply your own AC adapter. We recommend the Radio Shack 273-1431 AC adapter with a 274-328 connector adapter.

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U12D6L8U6D12BL8U12R4L8BL6BD12H6L
2R8U6L8D12BL6U12L8D12NR8BL6NU12M
-8,-12D12"
1810 REM N DAKOTA
1820 DATA"BR26BD18NR68D38R74U12H
2U6H2U6H2U6"
1830 DATA"BR20BD50R2NU12R8U12NL1
0BR6ND12R8D6NL8D6BR6U12D6R2NF6E6
BR6D12R8U12NL8BR4R4ND12R4BR4ND12
R8D6NL8D6BU18BL6U12D6L8U6D12BL8U
12R4L8BL6BD12H6L2R8U6L8D12BL6U12
L8D12NR8BL6NU12M-8,-12D12"
1840 REM NEBRASKA
1850 DATA"BR22BD18NR62D20R20D14R
60U8H2U6H2U6H6L4H4"
1860 DATA"BR8BD40U12M+8,+12U12BR
6NR8D6NR8D6R8BR4R2NU12R8U6NL8U6N
L10BR6ND12R8D6L8R2F6BR6U12R8D6NL
8D6BR6R6U6L6U6R6BR6D12U6R2NE6F6B
R6U12R8D6NL8D6"
1870 REM NEVADA
1880 DATA"BR36BD12R42D44L4G4D4H3
4U18"
1890 DATA"BR18BD40U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D8F4E4U8BR6ND1
2R8D6NL8D6BR4R4NU12R8U12NL10BR6N
D12R8D6NL8D6"
1900 REM NEW HAMPSHIRE
1910 DATA"BR40BD68R28E4R2E4R4E2U
4H4U2H4U42L2G4L4H2L4D4G2D12L4G4D
6G6D4G2D4G2D6G2D6F2"
1920 DATA"BR34BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL72D12U6R6U6D12BR6U12R6D6NL
6D6BR6U12R6ND12R6D12BR6U12R8D6NL
8BF6R6U6L6U6R6BR6D12U6R6U6D12BR6
NU12BR6U12R8D6L8R2F6BR6NR6U6NR6U
6R6"
1930 REM NEW JERSEY
1940 DATA"BR56BD4M+20,+10D8G6D2F
4R2F4M-8,+24G4L4U6L8H8L2H4U4E6R2
E2U2H6U8R2U8E6"
1950 DATA"BR36BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL62R8L4D12L4BR14NR8U6NR8U6R
8BR6ND12R8D6L8R2F6BR6R8U6L8U6R8B
R6NR8D6NR8D6R8BR6BU12D4F4ND4E4U4
"
1960 REM NEW MEXICO
1970 DATA"BR36BD14R54D40L44D8L10
U48"
1980 DATA"BR36BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL62ND12R8ND12R8D12BR6NR8U6N
R8U6R8BR4F6NG6NF6E6BR6ND12BR6NR8
D12R8BR6NU12R8U12L8"
1990 REM NEW YORK
2000 DATA"BR78BD4R24D16L2D12R2D1
8L2D10G4L4M-22,-9H6L50U6E6R2E4U2
R4U2R10D2R16U2E4U2H4E10R4E2R4BD6
0BR22E2R4E2R8D6L8G2L8U4
2010 DATA"BR36BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL46D4F4ND4E4U4BR6ND12R8D12N
L8BR6U12R8D6L8R2F6BR6U12D6R2NE6F
6"
2020 REM OHIO
2030 DATA"BR92BD14D26G4D2G4D2L4G
2D4L4G2D2L4H6L2G2L6G2L4H6L4H4U32
R4E4R4F8R16E4R4E4R4E2R6"
2040 DATA"BR36BD40U12R8D12NL8BR6
U12D6R8U6D12BR6NU12BR6U12R8D12L8
"
2050 REM OKLAHOMA
2060 DATA"BR96BD24D28L10H2L2G2L4
H2L4H4L6G2L4H2L8H2U16L24U6R78"
2070 DATA"BR6BD40U12R8D12NL8BR6U
12D6R2NE6F6BR6NU12R4BR6U12R8D6NL
8D6BR6U12D6R8U6D12BR6NR8U12R8D12
BR6U12R6ND12R6D12BR6U12R8D6NL8D6
"
2080 REM OREGON
2090 DATA"BR106BD14NH4M-6,+14F6D
28L80H4U8E4U34R14F2D6F2R12M+20,-
8R8E2R6E2R6"
2100 DATA"BR20BD40U12R8D12NL8BR6
U12R8D6L8R2F6BR6NR8U6NR8U6R8BR6N
R8D12R8U6NL2D6BR6NR8U12R8D12BR6U
12M+8,+12U12"
2110 REM PENNSYLVANIA
2120 DATA"BR20BD18E6R2D4R70F10D2
G4D2G4F8D4G6L4G4L74U40
2130 DATA"BR4BD40U12R6D6NL6BD6BR
4NR6U6NR6U6R6BR4ND12M+6,+12U12BR
4ND12M+6,+12U12BR4NR4D6R4D6NL4BR
8U6H4NU2F4E4U2BR4D12R4BR4BU12D8F
4E4U8BR4ND12R6D6NL6D6BR4U12M+6,+
12U12BR4D12BR4U12R6D6NL6D6"
2140 REM RHODE ISLAND
2150 DATA"BR46BD20ND30R26D8R2D6F
4R2F4D8G2L6U8H4L8D12L6G2L4G2L4U4
BR22U8R4D8L4"
2160 DATA"BR24BD32U12R8D6L8R2F6B
R6U12D6R8U6D12BR6U12R8D12NL8BR6R
2NU12R8U12NL10BR6NR8D6NR8D6R8BD1
8BL70NU12BR6R8U6L8U6R8BR6D12R8BR
6U12R8D6NL8D6BR8U12M+8,+12U12BR6
R2ND12R8D12L10"
2170 REM S CAROLINA
2180 DATA"BR36BD18E4R4E2R18F4R14
F12G12D2G8L2G4L4H4U2H4U2H8L2H8L4
H2L4U2E4R2"
2190 DATA"BR12BD50NR8U12R8BR6ND1
2R8D6NL8D6BR6U12R8D6L8R2F6BR6U12
R8D12NL8BR6NU12R6BR6NU12BR6U12M+
8,+12U12BR6ND12R8D6NL8D6BU18BL18
U12D6L8U6D12BL8U12R4L8BL6D12L8U1
2BL6D12L8U12NR8BL6L8D6R8D6L8"
2200 REM S DAKOTA
2210 DATA"BR26BD12NR68D38R64F4R2
F6U4H2U4E2U4H2U12H2U6H6E2"
2220 DATA"BR20BD50R2NU12R8U12NL1
0BR6ND12R8D6NL8D6BR6U12D6R2NF6E6
BR6D12R8U12NL8BR4R4ND12R4BR4ND12
R8D6NL8D6BU18BL8U12D6L8U6D12BL8U
12R4L8BL6D12L8U12BL6D12L8U12NR8B
L6L8D6R8D6L8"
2230 REM TENNESSEE
2240 DATA"BR26BD28R90G6L2G4L8G4L
2G6L66U4E2U6E4U4"
2250 DATA"BR10BD40U12L4R8BR4NR6D
6NR6D6R6BR6U12M+8,+12NU12BR6U12M
+8,+12U12BR6NR6D6NR6D6R6BR6R6U6L
6U6R6BR6NR6D6R6D6NL6BR6NR6U6NR6U
6R6BR6NR6D6NR6D6R6"
2260 REM TEXAS
2270 DATA"BR50BD4R12D14R4F2R4F6R
8E2R4F2R6F2D8F2D6G4L4G6L4G4D8L4H
4L6H6L2H4L2H6L4G6L2H2L4H10U2H4R2
8U30R4"
2280 DATA"BR28BD40U12L4R8BR4NR6D
6NR6D6R6BR6E6NH6NE6F6BR6U12R8D6N
L8D6BR6R8U6L8U6R8"
2290 REM UTAH
2300 DATA"BR40BD8R22D14R20D36L42
U50"
2310 DATA"BR32BD40NU12R8U12BR6R4
ND12R4BR6ND12R8D6NL8D6BR6U12D6R8
U6D12"
2320 REM VIRGINIA
2330 DATA"BR24BD48R88U4H4L2H4U4H
2M-12,-4U4H4L2H4L8G4L2G12L6G4L6H
4L4G6D2G10R10"
2340 DATA"BR18BD28D8F4E4U8BR6D12
BR6U12R8D6L8R2F6BR6NR8U12R8BD6NL
2D6BR6U12BR6ND12M+8,+12U12BR6D12
BR6U12R8D6NL8D6"
2350 REM VERMONT
2360 DATA"BR88BD4D4G2D12L4G4D6G6
D4G2D4G2D6G2D6L22U22L4U4E2U18M+6
,-14R38"
2370 DATA"BR12BD28D8F4E4U8BR6NR8
D6NR8D6R6BR6U12R8D6L8R2F6BR6U12R
6ND12R6D12BR6NR8U12R8D12BR6U12M+
8,+12U12BR4R4ND12R4"
2380 REM WASHINGTON
2390 DATA"BR36BD14R62D36L16M-40,
+6H2U4L8H2M-6,-20H6U2R8F4R4U2H2U
2H4R6"
2400 DATA"BR6BD28D12R6NU12R6U12B
R4ND12R6D6NL6D6BR4R4U6L4U6R4BR4D
12U6R6U6D12BR6NU12BR6U12M+8,+12N
U12BR4NR8U12R8BD6NL2D6BR4BU12R4N
D12R4BR4D12R6U12NL6BR4ND12M+8,+1
2U12"
2410 REM WISCONSIN
2420 DATA"BR42BD62R42U12E2U6E2U4
E2U4E2U4L2M-8,+12L2U8R2U6H4M-22,
-6L6U4L4D2L8D7G2L2G6D10F10D6F2D6
F4"
2430 DATA"BR8BD28D12R6NU12R6U12B
R6D12BR6R6U6L6U6R6BR6NR6D12R6BR6
NR8U12R8D12BR6U12M+8,+12U12BR6NR
6D6R6D6NL6BR6U12BR6ND12M+8,+12U1
2"
2440 REM WEST VIRGINIA
2450 DATA"BR56BD10D10R18D8R4E6R4
E2R6F4D4L6D2G4D2G6L4M-8,+12F2D4G
2L4G2L14H2L4H4L4H4L2H2U4H2U4E4U2
E4U2E6U2E6U2E4U2E4D4"
2460 DATA"BR18BD38D8F4E4U8BR6D12
BR6U12R8D6L8R2F6BR6NR8U12R8BD6NL
2D6BR6U12BR6ND12M+8,+12U12BR6D12
BR6U12R8D6NL8D6BU18BL66NU12R6NU1
2R6U12BR6NR8D6NR8D6R8BR6R8U6L8U6
R8BR4R4ND12R4"
2470 REM WYOMING
2480 DATA"BR34BD18R56D36L56U36BF
8F4R2U6L2G2"
2490 DATA"BR12BD28D12R6NU12R6U12
BR6D4F4ND4E4U4BR6D12R8U12NL8BR6N
D12R6ND12R6ND12BR6D12BR6U12M+8,+
12U12BR6NR8D12R8U6L2"
2500 CLS0:FORI=1TO50:TEM$=P$(I,1
):P$(I,1)=P$(I,2):P$(I,2)=TEM$:N
EXT
2510 GOTO95
2520 CLS:PRINT@101,"YOU TRIED"NC
+NW"TIMES &":PRINT@165,"ANSWERED
"NC"CORRECTLY"
2530 PRINT@229,"WHILE DOING"NW"W
RONG."
2540 NQ=NC+NW:IF NQ=0THEN NQ=1
2550 MS=INT(NC/NQ*100)
2560 PRINT@293,"YOUR SCORE IS"MS
"%."
2570 PRINT@357,"ANOTHER TRY (Y/N
/C) ?";
2580 X$=INKEY$:IFX$="Y"THEN RUN
2590 IFX$="N"THENCLS:END
2600 IFX$="C"THEN260
2610 GOTO2580
```
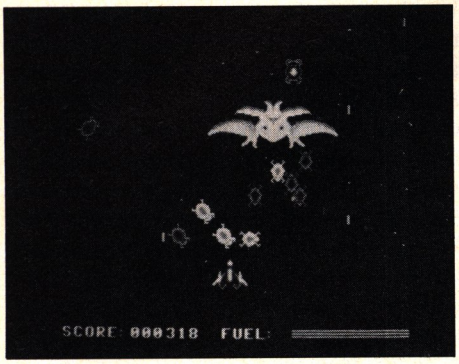

Game CoCo 3

Zenix

Zenix is a machine-language, shoot-'em-up space game written for the CoCo 3. It requires one joystick and a 35- or 40-track disk drive and supports RGB and composite monitors. Obviously the color and detail are better on an RGB monitor.



Zenix is a fast-paced arcade game that contains smooth and colorful Hi-Res graphics along with exciting sound effects. The object of the game is to guide your plutonium plasma laser-equipped space ship to the planet Zenix to deliver a single crucial blast and destroy the planet. This destruction is necessary because the Zenians have evolved into a race of semi-intelligent insectoids that have been at war with other peace-loving planets in the universe. You get only one chance to destroy Zenix if you can successfully defend yourself against the Zenian war ships.

As the game begins, your ship is attacked by swarms of insect-like enemy crafts. You must kill them all before advancing to the next level. The crafts' colors are important. Purple crafts contain extra fuel your ship can use. When a craft is shot, it changes color. You must collide with them after the color change to increase your fuel capacity. Sometimes they even contain extra weapons that you can use. A fuel gauge is shown at the bottom of the screen so you can keep track of your status. Each time your ship is hit by one of the enemy ships the gauge will show less fuel. You die when the fuel gauge is empty. If you accidentally shoot the enemy ship after it has already changed to a solid color it will explode. You get extra points, but no extra fuel or weapons.

Different colored enemy crafts are worth various points, added fuel or weapons. You will quickly learn what colors provide the most benefit. After the successful completion of every fourth level a bonus round is awarded. There are 32 levels of increasing difficulty in *Zenix*. The Zenians also shoot different colored bullets at you. Some bullets are heat seeking while others are armor piercing. The tough part is learning to dodge enemy ships and their bullets while, at the same time, shooting and colliding with them at just the right moment. A pause mode allows you to catch your breath and gather your wits. High scores are added to the game disk as a reminder of outstanding game performance. Don't be disappointed if you don't catch Jeremy Spiller.

Zenix is copy protected but a backup of the original is possible. The backup can be used only in conjunction with the original disk. You can get a replacement disk for a nominal fee. *Zenix* is accompanied by a five-page instruction booklet that explains the backup procedure as well as game strategy and scoring. *Zenix* is the best arcade game I've seen for the CoCo 3. I was especially impressed with the quality of the graphics, sound effects and smoothness of operation. This is one game you definitely want in your CoCo 3 library. *Zenix* is available from the producer, GOSUB Software, as well as Gimmesoft and Eversoft Games, Ltd.

(GOSUB Software, P.O. Box 1094, Townsend, MA 01469; $29.95)

— Robert Gray

Utility CoCo 1, 2 & 3

Baby BASIC

About a year ago, I wrote a review of DanoSoft's *Big BASIC*. It is a marvelous product that allows the user to write literally dozens of BASIC programs and load them into memory simultaneously. It is a very useful and versatile programming utility and quite inexpensive. I often wondered how it is possible to load several programs into memory at the same time — and why a similar system had not been developed for the CoCo 2 in the heyday of 64K. In a machine with twice that capability, 28K of user memory didn't seem fair.

I occasionally dabble in stage magic. I know it isn't often that a good conjurer reveals his best secrets, but sometimes he gives his students a glimpse of the inner workings of a simpler form of his most popular tricks. Bill Daniels of DanoSoft is a magician of the Color Computer. With his latest product, *Baby BASIC*, he lets us in on a couple of cute tricks.

Baby BASIC will not be the hit of the next RAINBOWfest, nor will it be seen on the cover of next month's RAINBOW. *Baby BASIC* just isn't that sort of a product. It is difficult to say what kind of product this is. It might be called an educational utility. You won't need it unless you write BASIC programs. Some programming capability is required to use it.

Baby BASIC releases that unused RAM. About fifty 8K blocks in a 512K CoCo 3 (10 blocks in a 128K machine) are available for use. That is roughly 80K to over 400K of user-accessible RAM. It teaches you how to free up to 9.5K in a CoCo 2 that you can use for BASIC programs. It also teaches you efficient, modular, structured programming — unless you already practice that style of programming. If your interest is in more RAM for ready-made games, *Big BASIC* is your best buy. The purchase of *Baby BASIC*, however, allows you to write some great games. For example, with *Baby BASIC* it is possible to create an Adventure game that uses 8K for each of four dozen levels.

Baby BASIC uses a handful of peeks and pokes to achieve the amazing. Even though the program is written entirely in BASIC, it accomplishes incredible feats. The program consists of seven subroutines. The first subroutine calls the program segments in high memory. The second and third subroutines return control and store the high-memory blocks. The fourth switches between blocks of memory. The fifth and sixth subroutines perform housekeeping functions. And the seventh releases that 9.5K in the CoCo 2. Subroutine 7, strictly a CoCo 2 routine, is used independently of the rest. The three pages of 80-column printed listing may be confusing at first, but Bill Daniels' documentation and comments in the program itself will guide you through it. I had a program calling a subroutine in high memory in about a half an hour on my first try.

I find it useful to break the program up into smaller segments. Subroutines 1 and 4 should stay by themselves. Subroutines 2 and 3, along with 5 and 6, can be paired together and stored on the disk. These pairings give you a skeleton around which to build your larger program.

I also find it advantageous to delete much of the documentation from my frame-

work routines to keep them small. Once their functions are understood, they can be kept as black-box routines that use secrets to perform their magic. No longer is it necessary to understand them in depth. Since you may never need all six of the CoCo 3 routines in a single program, it is beneficial to break them up as needed.

Baby BASIC is not for baby programmers. I am a programmer whose professional experience is on larger computers used by an insurance company. I find this a challenging package to work with. It teaches efficiency while also instructing the user in the finer points of CoCo architecture. Even if you already have *Big BASIC*, you might want to try *Baby BASIC* as a learning tool.

(Danosoft, P.O. Box 124, Station A, Mississauga, ON L5A 2Z7, Canada; 416-897-0121; $8.95, $10.50 Cdn., plus $2.50 S/H)

— Fred Toon

Game CoCo 3

Mind-Roll

Mind-Roll is a 3-D game of speed and dexterity for your 64K CoCo 2 or CoCo 3. The game comes as a plug-in cartridge that works either directly in the cartridge slot on your CoCo, or plugged into a Multi-Pak Interface. You will see better color and graphics if you have a CoCo 3 and an RGB monitor than with a CoCo 2 and a color composite monitor. A joystick is optional, but I recommend one if the game is to be played to its full potential.

Mind-Roll challenges you to move an 8-ball through a series of twisting, complicated planes. Throughout this maze you will encounter electric oceans, invisible walls, and all sorts of other treasures that serve to increase your score. You must move your ball carefully over the tricky, frequently narrowing paths to avoid falling into infinity. With each successfully completed plane, a bonus round is awarded. You are then able to select which plane you want to pursue. In this game, time is your worst enemy. The amount of time remaining is shown in the upper right corner of the screen.

You must also be aware of symbols that appear on the screen during play. Some of these symbols add to your score as they are captured, and some will kill you. You will not immediately know which symbols are which, but after a few rounds it will be obvious which to capture and which to avoid. The game has 10 planes, each more difficult than the one before.

Mind-Roll is a game of good, clean fun that is both challenging and interesting. The sound effects are lively and the graphics are good. These features, however, are not comparable to the quality of previous CoCo 3 programs.

(Epyx, distributed by Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; Available in Radio Shack stores nationwide, Cat. No. 26-3100, $34.95)

—Jerry Semones

Telecommunications CoCo 3

CEBBS 2.1

I reviewed *CEBBS*, the CoCo Electronic Bulletin Board System, in the November 1989 issue of THE RAINBOW. Since then many improvements and additions have been made to the program, and the result is *CEBBS 2.1*. For those who are unfamiliar with the original *CEBBS* and do not have access to the earlier review, here is a brief synopsis of *CEBBS*.

CEBBS is a collection of programs, in both BASIC and machine language, that allows CoCo 3 owners to run and maintain a bulletin board system. To use *CEBBS* you need an RS-232 Pak and a Multi-Pak Interface (or Y-cable), an auto-answer modem with a DTR (Data Terminal Ready) lead, and at least one disk drive. If your CoCo has 512K, using a RAM disk will greatly increase performance. As with any BBS, disk storage is at a premium, which makes extra disk drives and/or a hard drive helpful. Combine this hardware with the *CEBBS* system, and you have an excellent, powerful and flexible BBS.

CEBBS programs are written in BASIC, with four exceptions. The driver that takes care of I/O via the modem is an excellent piece of machine-language programming, as is the routine responsible for the file-transfer features. The software clock driver and some patches to the operating system are also written in machine language.

CEBBS is designed to be easy for the SysOp to use and still remain powerful and flexible. The SysOp sets up the BBS as desired through the use of menus. These menus display the desired text and allow access to the various functions the board makes available. The functions supported by the package include chat, text file display, movement between menus, view time and date, show user's status, list users, change user parameters (such as password, upper/lowercase, etc.), protected exit to BASIC (allows remote operation by the SysOp), and logging off the system. There is also a function to call the message base. The number of different message sections (forums) available is limited only by disk space. Finally, there is a function to allow file transfers, as described below.

The system includes easy-to-use maintenance utilities for editing the message base, user log, the quotes of the day, and the file descriptions. These programs make the SysOp's job a great deal easier and less time-consuming.

In short, *CEBBS* is a full-featured, flexible, user-friendly BBS. And now, with the *Version 2.1* update, it is even better. While the changes and improvements to the board are numerous, several are particularly outstanding. It is now possible to send ANSI escape sequences (like those used on some PC BBSs) to enable color, cursor, and attribute control. Not only are these sequences sent to the user's system, they are performed on the local CoCo 3 screen! You can move the cursor up, down, left, or right a specified number of lines or columns to a particular screen location. You can also clear text from the cursor to the start or end of the screen. Underlining can be turned on or off, as can blinking. The foreground and background colors can be changed. Many other cursor-control sequences are provided. ANSI graphics are really fun and make the package more colorful and exciting.

CEBBS is a full-featured, flexible, user-friendly BBS. And now, with the *Version 2.1* update, it is even better.

The upload and download functions have been greatly expanded. They now feature Xmodem and Ymodem (Checksum or CRC) and ASCII file transfers. Getting around in the file transfer section and finding desired files has also been improved, including provision for keyword searches. The file-

transfer section is now full-featured and quite sophisticated.

CEBBS now supports XON/XOFF (CTRL-S and CTRL-Q) flow control at any time, which allows users to pause and then resume output. The message section has also been improved to give users post-only or read-only access to a message base.

The disk comes with four programs to be used by those purchasing *CEBBS 2.1* as an upgrade to an earlier *CEBBS* system. These files will change the old user log, message base, quotes, and download descriptions files for compatibility with the new format.

Other changes throughout the system make this great BBS package even better. Many of these changes are the direct result of user suggestions. Kevin Berner, the program's author, has his finger on the pulse of the owners and users of *CEBBS*, and is receptive to their ideas. Almost all of the complaints from my first review have been addressed. Kevin has shown that he plans to continue his support of and improvements to *CEBBS*. When I spoke with him recently, he said he has developed a games pack for use with the system. It contains several games and other programs, such as a voting booth.

If you are interested in starting a BBS using your CoCo 3, or have an earlier version of *CEBBS*, you should seriously consider *CEBBS 2.1*. Its power, flexibility and support put it in a class by itself.

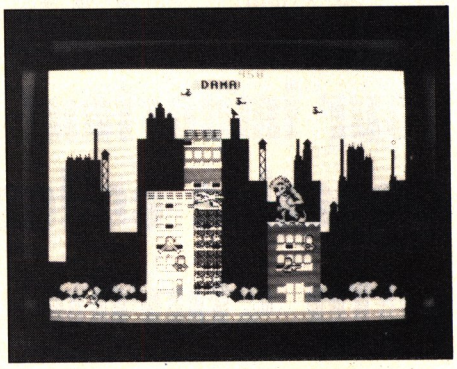
(KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931; 407-799-3253; $49.95, or $8.95 to upgrade from an earlier version of CEBBS, plus $3 S/H)

— Michael Toepke

Game	CoCo 3

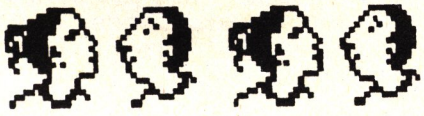
Rampage

While many video games put you in control of a very sophisticated piece of equipment designed to battle evil foes, *Rampage* puts you on the other side of the fray. In this game, a Tandy ROM Pak by Activision, *you* are the ugly monster, and *you* are the one being shot. Soldiers, tanks and helicopters all blast away while you storm through city after city pulverizing buildings with your massive fists. Along the way you can eat nearly everything in sight (monsters have appetites, too, you know), including many different items found in punched-out walls. Some of the items increase your energy while others have the opposite effect. It takes some practice before you can tell which ones do which.



Getting started with *Rampage* is quick and easy. The program asks whether or not you have an RGB monitor and how many people are playing (up to three can compete using two joysticks and the keyboard). Each player is allowed to choose which of the three different monsters he wants to control. Once that is out of the way, the game begins.

Each city consists of one screen containing three to six buildings. Once you succeed in demolishing each building, a news flash appears on the screen announcing your next target. There are over 100 cities to wreck, many of which can be smashed



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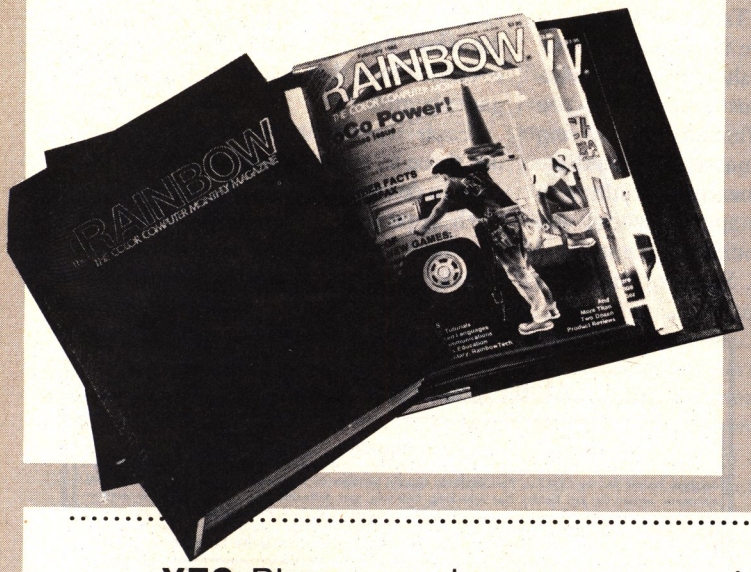

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more than once. This should keep even the most devastating monsters busy for hours.

Rampage is a very faithful adaptation of the arcade game of the same name. The graphics and sound effects are quite satisfactory, and the feel of the game is accurately captured for the small screen. As with many of the current generation of multiplayer arcade games, *Rampage* allows additional players to jump in while the game is in progress. Although in the arcade version this feature is obviously a fiendish plot designed to solicit more quarters, I have always liked this feature, and it works well in the CoCo version.

Several characteristics of *Rampage* are less than exciting. First among these is that the sluggish nature of the arcade game is recreated in the CoCo version. The monsters move, punch and jump at an annoyingly slow pace. Helicopters and tanks crawl across the screen. Each city occupies a single screen, which makes the display seem stationary. I see no discernable difference between one city and the next. This means that your hand-eye coordination can be left in your hip pocket. A slow-paced game that requires careful thought and strategy is fine. Unfortunately, *Rampage* has no such requirement. The only thought required is trying to decide what to eat and what not to eat as you are punching at walls.

Game control is another problem. Although the joysticks respond adequately, the game does not work with standard joysticks. Only the deluxe model can be used with the game. The keyboard controls respond well, but there is little rationale for which keys are used. The game's design is not an efficient one. To further complicate the situation, the instruction manual is not correct.

A game that lacks speed and strategy can still survive if it has personality or intrigue. The universe being saved from an evil empire. A kidnapped king rescued from the hands of kung fu masters. Something. Anything. The *Rampage* manual asks, "What's the point?" The answer is that the purpose of all this wanton destruction is to get points. For some people that may be enough. After playing the game, however, I felt as though I had accomplished nothing except having wasted some time.

I worried that maybe I had just gotten old, so I coerced my 8-year-old video gamemaster son to join me for a few games. He has on occasion been known to sink quite a pocketful of quarters into the arcade version of *Rampage*. He was bored after two games. Instead, he went to his room and watched his plants grow. I was unable to talk him into playing another game. I think this is a sufficient summary of the program.

(Activision, dist. by Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; available in Radio Shack stores nationwide, Cat. No. 26-3174; $34.95)

— Jim K. Issel

Communications 0S-9 Level II

The Wiz

One of the most popular types of software is the communications or terminal program. While there have been numerous terminal programs written for the CoCo under Disk BASIC, there have been few for OS-9. In fact, most of the OS-9 terminal packages are in the public domain, and I must admit that some of the more recent ones are quite good.

One of the first commercial programs written for OS-9 Level II, and which makes use of the windowing environment, is *The Wiz*. The program, written by William Brady and distributed by Frank Hogg Laboratories, was first available soon after Tandy introduced OS-9 Level II.

Novices Niche

Utility 4K

Peeking at 135
by Keiran Kenny

When you press a key on the keyboard, The ASCII (or CHR$) value of that key is poked into memory position 135 and remains there until you press another key. Try this shortie:

```
10 PRINT CHR$(PEEK(135));:GOTO10
```

A simple press on a key will have CoCo printing that key repeatedly until you press another key.

PEEK(135) can be substituted for an INKEY$ entry in programs where you do not want to pause the action while the program waits for a keypress. In this program, CHR$(159) keeps flicking on and off. While it is running, press a key (1-9) to GOSUB 100 (or whatever) and return without noticeably delaying the execution of the program. The entry POKE(135),0 in Line 50 restores its normal value to memory position 135. Otherwise Line 40 keeps repeating until you press another key.

I used PEEK(135) in my programs *Peekasso Prints* (Jan. '87) and *Mirror Image* (Oct. '87). In these programs, a single keypress sets a graphics trace moving in a chosen direction. It will continue moving in that direction until you press another key to stop or change direction.

The Listing: PEEK135

```
0 'COPYRIGHT 1990 FALSOFT, INC.
1 'PEEK(135)' by Keiran Kenny,
   Sydney, 1988.
10 CLS
20 PRINT@144,CHR$(159)
30 IFPEEK(135)>48ANDPEEK(135)<58
THENP=PEEK(135)-48:PRINT@204,"SU
B. ";ELSE60
40 ONP GOSUB100,200,300,400,500,
600,700,800,900
50 POKE135,0
60 PRINT@144,CHR$(143)
70 GOTO20
100 PRINT"100":RETURN
200 PRINT"200":RETURN
300 PRINT"300":RETURN
400 PRINT"400":RETURN
500 PRINT"500":RETURN
600 PRINT"600":RETURN
700 PRINT"600":RETURN
800 PRINT"800":RETURN
900 PRINT"900":RETURN
```

To use *The Wiz*, you need a 512K CoCo 3, OS-9 Level II with BASIC09 and an RS-232 Pak or other 6551 ACIA hardware. If you use the RS-232 Pak with a Multi-Pak Interface, you should have the PAL upgrade.

Unlike most other terminal programs, installation of *The Wiz* is not straightforward. The program comes with its own device driver and descriptor that optimize the CoCo operating as a terminal. This necessitates the creation of a new boot disk. For an OS-9 hacker this is no big deal, but I know many people who don't like to fool around with making a new boot disk, especially with the so-called boot problems. I strongly recommend the program *Ez-Gen* from Burke and Burke for any type of boot modifications (Note: *Ez-Gen* is not required for the installation of *The Wiz*'s device driver and descriptor.)

If you follow the OS-9 manual, you can prepare the new boot using `OS9Gen`. *Ez-Gen* simplifies the process. Using *Ez-Gen*, I added the driver and descriptor to my current boot disk. I kept the original Tandy /t2 device descriptor and `ACIAPAK` device driver so I could continue to use other terminal software.

After rebooting the CoCo with the new boot disk, I moved *The Wiz*'s software modules to my current execution directory, `/h0/APPL`. The manual describes the various modules that must be in memory; but I won't get into all of that. I should note, however, that most of *The Wiz* is written in BASIC09; therefore, you will need to have `runb` in memory.

Now, before anyone gets bent out of shape because *The Wiz* is written in BASIC, let me assure you that this is not a problem. There are several machine language modules that take care of the parts where speed is important. I have run *The Wiz* at 1200 baud with absolutely no problems. According to the author, it can be run at much higher speeds (up to 19200 baud; it has been successfully run at 4800 although data throughput tops out at approximately 1800 baud with no problems.)

So what are some of the features of *The Wiz*? There are many, but I've listed those I feel are most important:

- Autologging — uses a Tandy Model 100 approach
- Colors, fonts, boldface and proportional print are all configurable
- Xmodem and Kermit for file transfer (a public domain version of Kermit is provided and easily run from *The Wiz*)
- User definable BREAK key
- Conference mode
- Usage log
- Download to disk
- Redisplay of last 2048 characters received
- Dedicated device driver optimized for the CoCo 3 when operated as a terminal
- VT-52 emulation
- All standard handshaking modes are supported

As you can see, *The Wiz* is a full-featured terminal package that provides the average user with very good capability. With the autologging capability, you can customize *The Wiz* so it automatically logs onto a system such as CompuServe or Delphi. These customization files are kept in the `/dd/COM` directory and can easily be prepared with a text editor.

Earlier versions of *The Wiz* were provided with a program called `NewHost`, which generates the configuration file. According to the author, the configuration file is no longer provided. Having seen `NewHost`, however, I think it is a mistake not to include this program in the package and strongly encourage Frank Hogg Labs to do so with any future versions of *The Wiz*.

While reviewing *The Wiz*, I tested the program on several systems including CompuServe, a PC-operated bulletin board (TBBS), an IBM mainframe and an SCO Xenix system. Operation on all of these systems is smooth and free of problems with the exception of the Xenix system.

Because *The Wiz* supports VT-52 emulation, I set the Xenix system for this; however, I had very poor success, as indicated by all kinds of extraneous control characters on the screen. I have tried a number of CoCo terminal programs that claim to support VT-52 or VT-100 emulation; none of them have been successful. I suspect that this may ultimately be a problem with the CoCo. In any case, I would not recommend *The Wiz* for use with a UNIX/Xenix system. For all the other systems, however, operation is excellent.

I noted at the beginning of this review that *The Wiz* makes ample use of the OS-9 windowing system. The screen is divided into essentially three windows: a one-line window at the top of the screen is a status bar; another one-line window at the bottom of the screen is used for error messages, events and conference mode; and the main window in the middle (22 lines) is used for display with the system being contacted. As is appropriate, there are several overlay windows used as menu and dialog windows. While all of this may sound confusing, let me assure you that windowing gives *The Wiz* a professional appearance.

If you follow THE RAINBOW, you will note that *The Wiz* is on sale with a copy of *WizPro* included. *WizPro* is a shareware terminal package that has been available for quite a while. While this may sound like a good deal, there is a problem — no documentation is provided on paper or in electronic form. In other words, there are no manual or document files on the disk.

I noted this to Frank Hogg Labs, and they informed me that they simply provide the disk but do not support *WizPro*. They indicated that they will inform the author and are surprised that no documentation is available. The bottom line is that you get a second terminal program included with *The Wiz*, but it is essentially useless since documentation is not provided.

Overall, I am very impressed with *The Wiz*. It is easy-to-use, except for creating a new boot disk. The documentation is excellent as is the performance. Since the price has been lowered and *WizPro* has been included (for what it is worth), it is a pretty good deal.

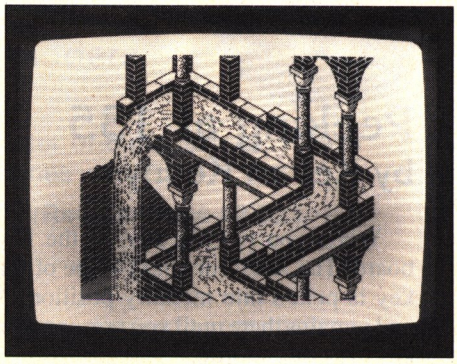
(Frank Hogg Laboratory, 770 James Street, Syracuse, NY 13203; 315-474-8225; $59.95)

— Donald Dollberg

Game	CoCo 1, 2 & 3

Grafix Disk Package

One of the first things that interested me in the CoCo was its potential for excellent graphics. If you have been around the CoCo community for any time at all, you have noticed that there is a great deal of interest in the graphics capabilities of this fine little machine.



T&D Software is a company that has assembled a series of disk packages that contain a wealth of pictures to view on your 32K CoCo with a disk drive. There are three packages of 10 disks, each covering an array of subjects. Some of the subjects include clip art, space pictures, animals, cars, buildings, celebrities, cartoon characters and R-rated images.

I had a chance to preview the disks. And after looking at the first disk, I couldn't wait to see the next one. Set 1 contains all sorts of clip art sketches, space pictures and

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animals. Set 2 contains digitized photos of well-known celebrities like Brooke Shields and Johnny Carson. It also contains other graphics that show off your CoCo. For example, a waterfall that drives a waterwheel in a rather interesting way. Set 3 contains material of an adult theme. Each digitized picture is R-rated and shows beautiful women in various stages of undress.

Each disk package has its own viewing program, but you can use almost any that are compatible with MAC pictures. The disk also has a graphics editor called MACPAINT that can be used to edit the various pictures for your own use. A joystick is needed to run both the VIEW and MACPAINT programs. The program also supports printing to make hard copies of your favorite pictures.

I was impressed with the extreme diversity of the disk packages I received for this review. These packages do not contain plain and simple graphics. Instead, they are very detailed and colorful images that should satisfy even the highest degree of graphics fever.

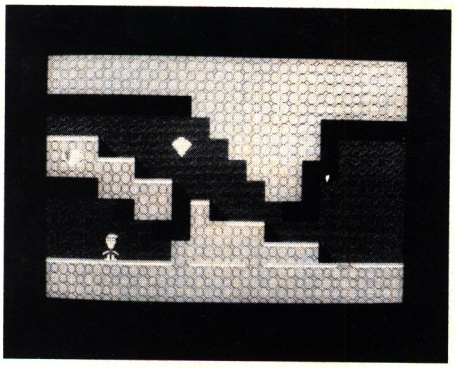
(T&D Subscription Software, 2490 Miles Standish Dr., Holland, MI 49423; 616-399-9648; $35 for each set)

—Jerry Semones

Game CoCo 3

Firespire

Firespire is a one-player arcade Adventure game for the CoCo 3 that requires a disk drive and a joystick, preferably the self-centering type. For those not familiar with arcade Adventures, these games combine the quick reflexes needed in arcade games and the cunning, mental prowess required to navigate through a maze.



As a gnome named Tal Hilar, you are sent on a quest to find the Firespire, a gnome weapon lost during the fierce Troll wars. Despite being armed with an energy-charged sword capable of disposing of any creature found in this world, it is not an easy task.

There are four distinct areas or worlds: the outer surface, halls and passages within monuments, rocks and pilings of the moat and an underwater lair. Each area has special hazards of its own. Death birds dive at you on the outside, huge jellyfish-like creatures charge at you in the halls and passageways, and poisonous bubbles rise from the moat. Just the mere touch of any of these is fatal. Fortunately, you have three lives and one *continue*. A continue lets you continue the game from the point where you lost your last life. Your score reverts to zero, but you can go on with another three lives and see what lies beyond without having to start from the very beginning. A nice touch.

Firespire is a fun game that will hold your interest for hours.

In your travels you find jewels, keys and icons that let you make super-jumps. The jewels and keys may be exchanged at your discretion for extra lives or continues. Three jewels may be traded for one extra life, while six jewels or one key gives you an additional continue.

Movement is accomplished by using the joystick, but you must stay on the platforms scattered throughout each screen. You may walk or jump from platform to platform; if you fall, you can steer your descent so that you land on another platform.

Keep in mind, however, that each area has creatures that try to impede your progress. These creatures can be killed by zapping them with your energy sword, which is activated by the joystick button. Should you miss a platform and fall to the bottom or if a creature touches you, one life is forfeited.

Each screen also has one or more windows — little white squares — that allow access to other areas. The problem is that only a few of these windows are entrances, and some need to be unlocked before passage to another area is possible. Since the only way to reach a window is to jump and fall into it, you lose many lives trying to determine which are entrances and which are not. It is advisable to map or keep track of the various windows. To get those easily frustrated persons started, the middle window on the second screen to the right leads to the inside of a monument.

The game comes with a four-page set of instructions that adequately covers all you need to know for survival. The graphics screens are not very detailed but are colorful, clear and crisp. By pressing the space bar, you get a status report screen that shows your current power, score, remaining lives, jumping ability, inventory and location. It can also be used as a pause feature or as a quick escape when you are about to be done in by those nasty creatures that never leave you in peace. Since the game is not timed, you can leisurely explore and map out each area as you travel through it.

There is one minor negative point — when you move from one screen to the next, the screen goes blank and you must wait a few seconds before the next screen appears. While this may be a bit annoying to the seasoned arcade player, the adventurer may welcome the chance to catch his breath. If you have a 512K CoCo, however, you can backup the disk to a RAM disk that speeds up the game.

All in all, *Firespire* is a fun game that will hold your interest for hours.

(SPORTSware, 1251 South Reynolds Road, Suite 414, Toledo, OH 43615; 419-389-1515; $21, introductory price)

— George Aftamonow

Game CoCo 3

Sprite-BASIC

According to the dictionary a sprite is a fairy, ghost or goblin; an apparition that moves freely around and through solid objects. The computer world defines a sprite as a graphics object that can freely move around the screen without affecting the background picture. We've all seen sprites in games such as *PacMan*. Those pesky little ghosts and PacMan himself are sprites.

Wouldn't it be great to create sprites for your program? Wouldn't it be even greater

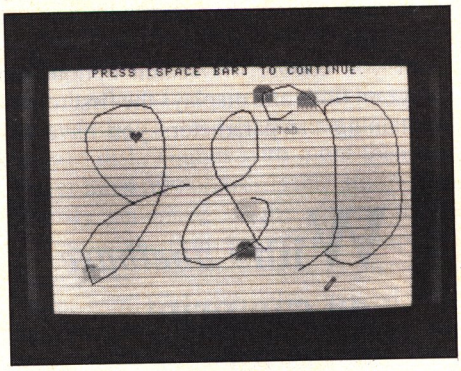
to have them move smoothly without flickering? And wouldn't it be amazing to be able to do this from BASIC without having to study a manual as thick as the local phone directory? If you answered yes to any of these questions then fire up the CoCo 3 and get ready because here comes *Sprite-BASIC* from Supersoft, Inc.

Sprite-BASIC does its magic on HSCREEN2 of any CoCo 3. HSCREEN2 was selected because it is the only Hi-Res screen that allows the use of all 16 palettes at once. You may choose your 16 colors from the 64 that are available. Create any graphics object you choose, up to 30 pixels by 20 pixels and, presto, a sprite is born. And you can use animated sprites if you build the background using *CoCo Max III* and palette switching.

Creation of the sprite is limited only by your imagination and is as easy as point and shoot. Or in this case, point and click. All you need is a mouse or joystick, a Hi-Res interface and your disk drive. You are then ready to create your first sprite.

To choose the color palettes, click on Colors on the menu bar. For convenience, all 64 colors are displayed on the screen at once. This is much easier than scrolling through all 64 colors to find the right one.

When you click on Sprites a sub-menu will drop down. Next click on Edit. Now you must decide the size of your sprite. It can be any size up to 30 by 20 pixels. Once your choice is made, you are ready to



create. A grid appears and you can begin creating your sprite one pixel at a time. The grid is an option that I feel makes it much easier to see what is happening. It is an oversized version of your sprite with the limits of each pixel clearly shown. A normal size version of the sprite is simultaneously shown in the upper left corner of the screen. Any or all of the 16 palettes can be used for your sprite — you select another color with a simple point and click.

When your artwork is finished simply click on Save and name your sprite. Your work is saved to disk. If you want to change the sprite, simply click on Load and the sprite is loaded from disk for editing.

Now is when the real fun begins. Once you have created and saved your sprites, you are ready to compile up to nine of them for use in your own programs.

To enter the compiler either click on Compiler from the sprite editor or LOADM "COMPILER" from BASIC. Select the sprites you want to use in your program. If you've forgotten their names, use the DIR command. Insert a disk and press ENTER. Your file is compiled. There are now 18 new, easily understood and remembered commands at your disposal for moving the sprites around your graphics display.

These new commands offer a myriad of possible uses. With them you can turn any compiled sprite on or off; move it up, down, left, right, or at angles; change horizontal and vertical speed; stop them; move them to new locations; pass them in front of or behind other objects; and even tell when they collide.

Did I mention the RAM disk? I didn't? Sorry! If you have 512K and Disk BASIC 2.1, the sprite editor automatically installs a RAM disk for your use. To turn on the RAM disk click on Ramdisk at the main screen. The RAM disk is also available from *Sprite-BASIC*.

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"...will blow your socks off...impossible to give Extended ADOS-3 anything other than a rave review." — Rainbow, October 1989.

"Flawless, compatible operation with just about everything under the sun...by far the most USEFUL product ever devised for the Color Computer." — CoCo Clipboard, Sept/Oct 1989.

ADOS-3 (reviewed July 1987)
Customize default startup message, colors, screen width, baud rate, step rates, processor speed, number of tracks (35, 40, or 80). Disk I/O and printing are reliable at double CPU speed. Extra commands such as FAST, SLOW, AUTO, RUNM, SCAN, CAT, PRT ON/OFF. Keystroke macros, arrow-key scroll through BASIC programs, edit/repeat of last command, auto-edit of error line, ML monitor, lots more. Usable as a disk utility or in EPROM. 128K Coco 3. EPROM-burning (cost is $15-20) information provided. Disk, **$34.95.** **ADOS** for CoCo 1 and 2 Disk, **$27.95.**

FOR OS-9: SmartWatch real-time clock with driver, **$30.00;** in Rompack, **$40.00.**

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The program comes with demos and 15 pages of clear, easily understood, step-by-step instructions that will have you creating your own sprites within 10 minutes. Really, that's all it takes.

You will be astonished at what can be done from BASIC, or should I say *SpriteBASIC*. At $44.95 it is a genuine steal. It adds commands and capabilites to the CoCo 3 that should have been there all along.

(Supersoft, Inc., 363 Oakwood Ave., Jackson, MI 49203; 517-787-3610; $44.95 plus $2.50 S/H)

— Randy Cassel

Utility — OS-9 Level II

Labelbase

There are many programs that allow you to print labels. Some are written to print only one type of label, such as address labels. With *Labelbase* you can print labels for addresses, disks, cassettes, VCR tapes — virtually any type of label up to a maximum size of 5½ inches long by eight inches wide. You can also use the program to print letterheads, invitations, Rolodex cards and envelopes.

This program provides an area for 10 of your printer's format codes so you can later imbed these within a label. This feature allows you to print your labels using many different fonts no matter which printer you own.

Labelbase requires a CoCo 3, OS-9 Level II and a printer. The program displays correctly only with an 80-column screen. This program is very easy to use. I had it running in about five minutes.

From the main menu, there are many options available. You can view the contents of your present working directory. You can also start, load or edit an address file that can later be used to print address labels, envelopes, etc. Other options allow you to enter printer codes used by your printer or take you to the label menu.

After you have initiated an address file, you can edit or enter text according to the fields already set up for you. The fields that can be used for a label include first and last name, street address, city and state, ZIP codes using five or nine digits, country, telephone numbers including area codes and birth dates. There is even a field for query entries.

Within the edit menu are three different ways to view or edit the address records. You can start at the beginning of the file and move forward or backward through the address records. You can choose to start at a certain record by entering its number, or you can search the entire file for records containing certain characters within one of the fields.

If you choose the search option, the program finds and displays the first record containing the parameters you have entered. You can then quit the search or continue searching through the entire file for any address records that contain the characters you are looking for.

With *Labelbase* you can print labels for addresses, disks, cassettes, VCR tapes — virtually any type of label up to a maximum size of 5-½ inches long by eight inches wide.

You cannot change the names of the fields within the address records. But there is no reason not to enter other data in a field, even if the data does not match the field name. For example, in place of a person's name you could enter the name of a disk, tape or other such data and then use the file to print that kind of label.

When you exit the edit menu, the address file is automatically saved to your current working directory. You can either make many different address files or one long file containing many addresses.

Configuring the program for your printer is very easy providing you know some of the function codes for your printer. Choosing the Configure option results in a screen display where you can enter codes that turn on and off ten different fonts or other functions used by your printer. These function codes are automatically saved to a file within the current working directory so they will be available the next time you use *Labelbase*. You can skip all this and use the default settings for your printer. These codes can later be embedded within a label definition, giving you a way to have different print styles on a label.

When you are ready to print a label you must go to the Label menu. The first thing I did was use the Configuration option, telling the program which size label I was going to be using. The maximum settings allow you to print letterheads since 80 characters will fit on a line when using Pica, which prints at 10 characters per inch.

After setting the size of the label, you are ready to edit the label. The edit screen has a handy font guide in the upper right corner that shows you how many characters at 10, 12 and 17 characters per inch fit on each line of the label you are editing. This guide and the display showing where the cursor is currently located in terms of which row and column helps you keep your text within the present label boundaries. Not only can you enter the text you want printed on a label, but you can get a little fancy by imbedding the previously configured function codes within the text. Also if you are printing address labels, envelopes or letterheads, you can merge any of the fields from the address records into the label. Then when you print the labels the program opens the address file you have loaded and prints the data contained within that field onto the label where you have merged the field.

Once you have a label looking the way you want, you can save that label definition or configuration to disk so you can load it later, saving you the trouble of entering it all over again.

When you are ready to print some labels, you are presented with some very nice ways to print it. You can choose to test print a label where only one label is printed so you can see if it prints the way you want. You can also choose to print many labels using data from an address file. If you use an address file, you can print the entire address file onto labels or select only certain labels to print using a procedure similar to the Search option on the Edit menu — only records that contain certain characters in a specified field will be printed. You are also provided the opportunity to tell *Labelbase* how many times you want the labels printed. If you are printing letterheads or invitations, you can choose to have a form feed sent to the printer so it will position itself at the top of the next page, ready to print the next letterhead or invitation.

Whew! Is this enough for you? The author of *Labelbase* has given a lot of thought to which features are most beneficial to the user.

I tried the program on two different-sized labels using the address files. I also printed a couple of letterheads. In every respect the program performed flawlessly.

The menus and prompts guide you

through the program very efficiently. And the manual, which comes in a nice three-ring folder, gives you complete and clear instructions that will have you printing those labels in no time.

(Constellation Computer Consultants, P.O. Box 423, Sanford, ME 04073; $14.95 plus $2 S/H)

— Richard McNabb

Game	CoCo 1, 2 & 3

Games Pack I

Games Pack I is a package of three fun-to-play programs for your CoCo 3 and disk drive. All three games are easy to operate and use onscreen instructions. The software is not copy protected so it is possible to make a backup copy. To run the program, simply type RUN"MENU" and press the ENTER key. The menu screen appears and provides a choice of three ready-to-run games, or an option to create your own word list for the first game selection.

Pardon Me Roy is a version of the popular Hangman game we have all played on paper. This version is very colorful and uses the excellent graphics capability of the CoCo 3. A gallows complete with noose is shown on the screen. In the upper left corner of the screen is an hour glass. The game can be played by one or more persons. It selects from either computer generated words or a word list you can create and save to disk. Games with more than one player must rely on words that are spontaneously generated by the players themselves and then entered into the computer. Each player has 10 chances to guess the secret word. As each letter is used, it is deleted from the alphabet shown on the screen. And with each miss, another piece of Roy is added to the gallows. Roy is a cheerful scarecrow whose hands and feet are of straw, topped off with the head of a pumpkin. He is a character tame enough even for small children.

Brainbuster is a variation on the old TV gameshow *Concentration*, in which contestants tried to match words and symbols hidden behind squares in a grid to solve a puzzle. With *Brainbuster*, you have several types of items hidden behind a grid of your own design from which to select. The grid can be as small as 5-by-5, or as large as 10-by-10. The difficulty of the game is up to player discretion. The matched items can be selected from graphics symbols, numbers, punctuation, or a mixture of them all. The number of players can range from one to seven. *Brainbuster* is a real challenge.

Master Mind is the most difficult game of this group. It requires a great deal of attention and concentration. Even though no graphics are used, this challenging game is still fun. The object of the game is to guess a sequence of five numbers. Each number can range from one to five. The computer signals the player when the right number is placed in the wrong position. There are 10 chances to correctly decipher the secret combination of numbers. Don't let the brief summation of this game fool you. *Master Mind* requires the mind of a master.

There is also a version of *Games Pack I* for use with the CoCo 1 and 2. The play is identical, but the graphics here are not as good as the CoCo 3 version. *Games Pack I* is a selection of programs that should be fun for the whole family.

(Eversoft Games, Ltd., P.O. Box 3354, Arlington, WA 98223; 206-653-5263; either version is $10 plus $2 S/H)

— Jerry Semones

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Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

CoCo MIDI Pro, a full featured MIDI recorder/sequencer written for the Color Computer 3 with 512K of memory and a disk drive or cassette recorder. Requires a hardware MIDI interface such as CoCo MIDI or Colorchestra plugged into slot three of a MultiPak (or a Y-cable). *CoCo MIDI Pro* turns your CoCo into a recording studio, complete with a sixteen track recorder, punch in/out capability, automatic synchronization, and extensive editing capabilities. *Musicware, Hamlet Rt. Box 1261, Seaside, OR 97138, 503-738-0119; $150, includes MIDI interface.*

◆ **Banking Master**, a machine-language program to help you keep track of both checking and savings accounts. Saves you money on unnecessary bank charges. Takes the guesswork out of knowing your exact bank balance. Requires a 128K CoCo 3 and disk drive; printer optional. *Russ Griggs, 1118 Perry Avenue, Bremerton, WA 98310; $20.*

The Super Book, a reference manual for BASIC and machine-language programming. Includes memory maps and hints and tips for beginners and hackers. Covers the CoCo 1, 2 and 3. *Supersoft, Inc., 363 Oakwood Avenue, Jackson, MI 49203, 517-787-3610; $14.95 plus $2.50 S/H.*

◆ **Commands/Errors 1**, three programs intended to be both an analytic and learning complement to the CoCo 3. Each program provides immediate access to the 168 BASIC commands and 39 BASIC errors contained in the Tandy Color Computer 3 BASIC and disk manuals. The `COMERR` program lets the user review and learn the commands and errors while leaving enough free memory to analyze the program commands and their use. *R.S. Research Associates, 479 S. River St., Wilkes-Barre, PA 18702, 717-822-7535; $25.*

Honor Quest: Revenge of Justice, a fantasy graphics Adventure for the CoCo 3 and one disk drive. You must destroy hordes of monsters, explore castles and search ruins, search out the secrets of the trap-filled temples, talk with surviving inhabitants for clues and finally storm the dark castle to destroy the Evil Empress and free the land. *Valkyrie Software, 37 Peter Bush Drive, Monroe, NY 10950, 914-783-0191; $27.95 plus $2 S/H.*

◆ **Goodies Disk One**, a set of ten utilities written in BASIC09. Includes a statistics program, a color mixer, a file ownership utility, a filter, a simulator, and five other programs. This package is both useful and educational. The source code is provided and the author encourages the user to learn from and experiment with the software. All programs, except the RGB color mixer, will run on any CoCo OS-9 system with `runb`. *The Warped Drive, 54 Martindale Dr. NE, Calgary, AB T3J 2V4, 403-280-8870; $12, $14 cdn.*

KJV on Disk #12, the book of II Samuel from the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. Word processor or text editor is recommended for viewing the files. Requires at least 32K and one disk drive. *BDS Software, P.O. Box 485, Glenview, IL 60025-0485; $3.*

KJV on Disk #13, the book of I Kings from the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. Word processor or text editor is recommended for viewing the files. Requires at least 32K and one disk drive. *BDS Software, P.O. Box 485, Glenview, IL 60025-0485; $3.*

◆ **Spell Master**, a 3D action/Adventure game where your character is trapped in a maze and must find all the magic nodes to escape. There are endless types of monsters and mazes. You create your own character and spells. Onscreen mapping and joystick controlled. Requires a CoCo 3, disk drive and joystick. RGB monitor recommended but not required. *Daniel Tuttle, 325 Hillstown Rd., Manchester, CT 06040, 203-643-1072; $18.*

Vocabase, a vocabulary/spelling/language database program. Will work with more than one student — all must use the same vocabulary list, but each is addressed, scored and rewarded independently. Scoring, timing and quality rating are given upon request. A reward game is provided for 5-10 correct answers on the first try. Requires 16K, disk or tape, Standard or Extended Color BASIC. *CoCoSoft, Beech and Broadway, Box 665, House, NM 88121; $8.*

The Quest for Thelda, an arcade game for the CoCo 3 with a disk drive. Joystick control is optional. Join in a magical search for six life forces that will set Thelda free from an evil wizard. Hi-Res graphics and extensive playing field. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, 412-372-5674; $34.95 plus $2.50 S/H.*

CoCo Cassettes #95, #96, and #97, each package contains 10 different programs. A wide range of interests are covered. Home Management, graphics, utilities, education, music, adventures, telecommunications and games. *T&D Software, 2490 Miles Standish Drive, Holland, MI 49424, 616-399-9648; $8 ea, $70 for yearly subscription.*

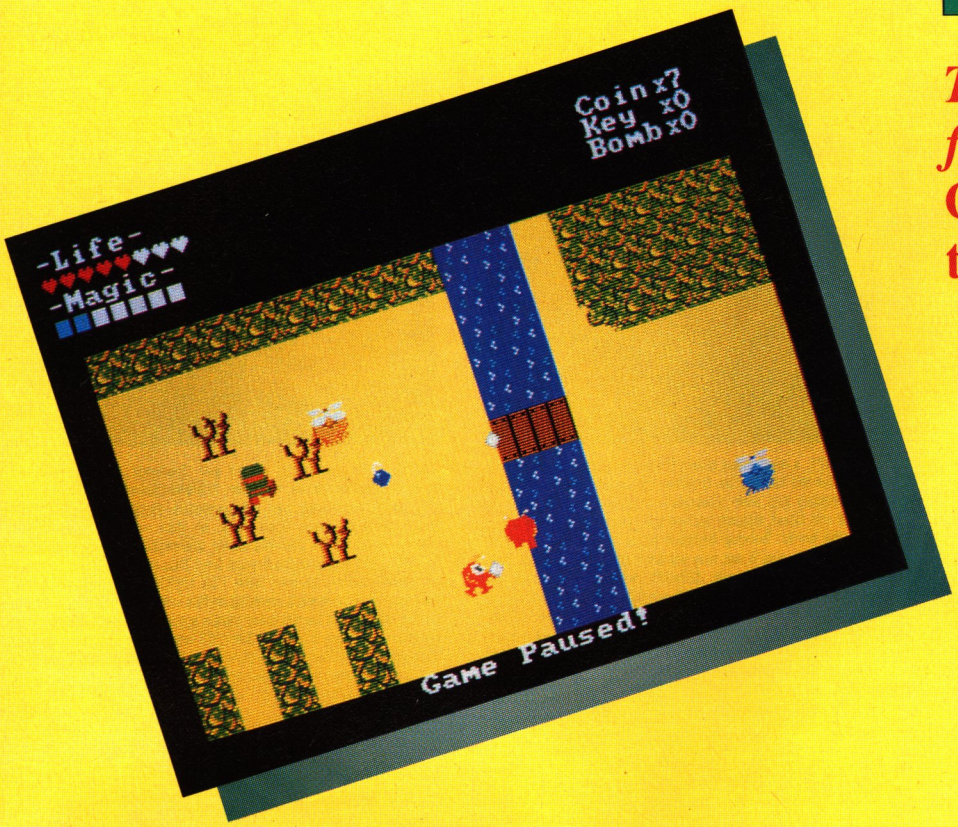
◆ **First product received from this company**

The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

Game CoCo 3

The Quest for Thelda -- Quench the Desire to Squire



Wondering what to buy a CoCo arcade game enthusiast? Well, just in time for the holidays there is a new, fast-action, arcade-Adventure game on the market: *The Quest for Thelda*. This CoCo 3 graphics adventure, available from Sundog Systems, is suitable for the young and old alike. You may be familiar with the author, Eric Wolf, who has had some of his earlier programs published in THE RAINBOW. This is one of his best works to date.

In *Thelda*, you assume the role of a squire. You will gain the hand of Thelda in marriage if you successfully retrieve the six life forces. Thelda is the King's daughter who has been kidnapped by an evil wizard. Having no idea of Thelda's beauty or lack thereof, you decide the quest is a noble cause. Off you march to search for the elusive life forces with visions of inheriting the throne.

The terrain is full of creatures who patrol the evil empire. If you attack and defeat these creatures they occasionally drop their booty. Their offerings include bombs, life points, spell points and coins. The coins can be used to purchase potions, weapons and other goodies from traders who reside somewhere in the maze.

The action on the ground level of play is brisk. I recall almost 10 different types of heathen riffraff obstructing my way through this level. Here you can collect coins from the creatures, which is a challenging task. Each beast conquered carries only a few coins, and some items for purchase fetch prices of hundreds of coins. Trial and error is the only way to discover which enemies carry coins. Sneaking up behind or to the sides of creatures is tricky. They move quickly and change directions often.

The graphics are well-drawn and colorful. The placement of cavern walls, rocks, trees, bushes, rivers and bridges has been carefully constructed. The surroundings give visual clues as to where you are in the game. Some of the creatures serve as directional markers as well.

You need quick reflexes when playing this game via keyboard or joystick control. You'll be in for quite a surprise if you can't master the overground obstacles. You see, the life forces are hidden deep in underground labyrinths. These labyrinths are difficult to navigate. Fast creatures with evil intentions await your entrance.

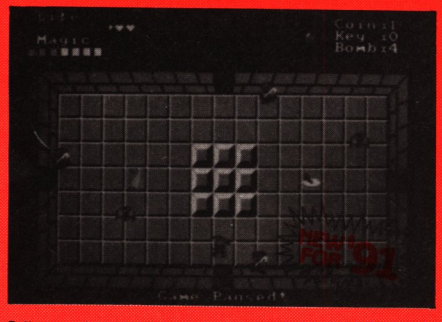
Try to obtain a source of light above ground because portions of the underground are dark. Monsters are visible but pathways are not. I bumped into walls and threw down planks to cross unseen waterways. A light in these dark sections would have kept panic to a minimum. Try to locate the compass and map icons. These game pieces come in handy. They provide you with an onscreen map of the underground maze showing the layout and telling you through which rooms you've already traveled.

There are only minor differences between playing *Thelda* on a 128K machine and a 512K machine. All graphics information is loaded prior to game play when you use a 512K CoCo. When played on a 128K CoCo, the program consults the disk to update graphics. But this doesn't happen with each move to another screen. Perish

NEW FOR '91

SUNDOG SYSTEMS

The Quest for THELDA



Better men than you have failed the quest, but the hand of the good princess Thelda is too much to resist! Stolen by the evil necromancer Divinax, she has been secreted far from prying eyes and it is now up to you to regain the pieces of the mystical Life Force and save the fair lady. The Quest for Thelda is an outstanding arcade program that combines action and adventure to bring you an incredible video game playing experience. Travel throughout over 500 different screens searching for magical objects and spells, fighting horrible creatures, and gathering the various parts of the Life Force guarded by ever-increasing terrors. You'll enjoy the highest quality 320x200 resolution 16 color graphics and digital sound effects that you've come to expect from Sundog Systems. The game play is fast and furious, and only you can rescue the princess and complete the **LEGEND OF THELDA!** Req. 128K CoCo 3, disk drive, and joystick (2-button joystick supported).

$34.95

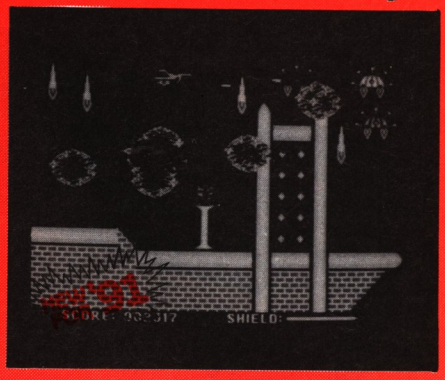
Hint book now available for Thelda! Contains clues, maps, and even a BASIC program to modify your own characters! **$4.95**

THE CONTRAS

In the year 2671, a mysterious object landed on Earth, heralding the alien invasion of the Red Falcon. Only two courageous soldiers have a hope of stemming this alien infestation. Armed with your military training and the latest weapon technology, you and a friend must fight back the horde. Sundog Systems presents our second 512K game, **The Contras.** You'll see why we decided to use 512K on this project! Amazing graphics with 320x225 resolution, 16 color full screen animation and horizontal smooth scrolling! Background digital sound effects and real-time music! One or two player action AT THE SAME TIME! You'll agree that this is one of the best arcade games yet for your 512K CoCo 3. Needless to say, playing hero won't be easy; playing The Contras will be tougher! Req. 512K CoCo 3, disk drive, and 2-button joystick.

$34.95

Crystal City



The superior technology of the evil Overlords has ensnared yet another innocent planet; however, this one contains the Crystal City, bastion of democracy and independence. Earth has had enough! Break through level upon level of their virtually invulnerable defenses, defeat the end guardians, and make your way ever closer to freeing the slaves of the Crystal City! This amazing arcade game is an achievement in its own right. Full 128K/512K utilization! Super fast horizontal hardware scrolling on the 128K computer! Wild digital sound effects and background music score! 30 minutes, or over 30 megabytes, of non-repeating 320x200 resolution, 16 color graphics! This game has it all; order a demo disk to see it first! Can you save the Crystal City from unbeatable foes? Req. 128K CoCo 3, disk drive, and joystick.

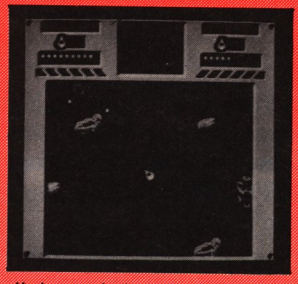
$34.95

Zenix

You have been chosen to pilot the spacecraft wielding the plutonium plasma laser against the nefarious insectoids, the Zenians. These bugs have been ripping off the space trade lines for years; now they're about to find a victim who can fight back! Beat back the swarm of pests to their home planet Zenix, and use the laser to end the menace once and for all. Zenix is a lightning fast arcade game for the 128K CoCo 3. The 320x225 16 color graphics are amazing, as are the digital background music score and effects, all on a 128K computer! The fast action and game play will astound you in this GALAGA of extermination. Plug in your joystick and strap in for the ride of your life! Call to order a demo disk to see the action before you buy! Req. 128K CoCo 3, disk drive, and joystick.

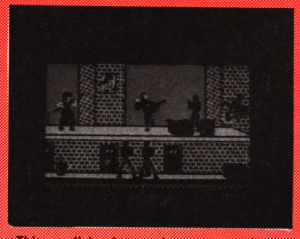
$29.95

SinistaaR



You've raved about this 512K arcade game! The graphics and animation are amazing! You've got to hear the digital sounds! 512K (three disks) packed with excitement. 512K CoCo 3 only. $34.95

KYUM-SAI TO BE NINJA



This martial arts arcade game remains a CoCo 3 phenomenon. One of our best sellers to date! Play the incredible combat experience that you've been missing, and call for the availability of the OS-9 version. 128K CoCo 3 action. $29.95.

SOUNDTRAX

This 128K/512K sound sequencing system has become an immensely popular program. Create musical scores using polyphonic digitized sounds and a user-friendly point and click editor. Call to order the SoundTrax demo program, and get 10% off your purchase with receipt. $34.95

Now Available: SoundTrax instrument sample disks! Guitars, strings, woodwinds, and just plain weird instruments for your composing pleasure. Completely compatible with the SoundTrax system. 3 flippy (2 sides) disks full of sounds. $12.95 each or $29.95 for all three.

ALSO AVAILABLE:

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the thought of this game being bogged down by continual disk access.

I can't say enough to praise the graphics of this package. Colors are comparable using an RGB or composite monitor. The above ground graphics remind me of many of the popular games systems available on the market. The underground graphics are even better. There are over 500 graphics screens in *The Quest for Thelda*.

I spoke with Eric and expressed concerns about finishing the game in time to meet review deadlines. He sent me a character with an overabundance of attributes. When the disk arrived I had just two life forces left to retrieve. Having gotten this far on my own I really didn't want to cheat to win. (If you're having problems defeating characters or locating certain rooms, there is help. A hint book is available from Sundog Systems for $4.95 plus $1 S/H. This book provides maps of the underground, character modifications, clues and fighting tips.)

I marched onward and battled strange forms to obtain the remaining life forces. A whirlybird creature that multiplied itself when attacked was one such obstacle. These creatures were reluctant to relinquish the life force they guarded. But with the staying power achieved by this squire, I managed to prevail. My next opponent was the giant elf. He was a formidable enemy who seemed impenetrable to all the spells in my bag of tricks.

I did finally slay this Goliath and I was treated to an appealing story conclusion. The credits scrolled with musical accompaniment. After hearing this music I wondered why I hadn't heard music earlier in the game. I think a recurring theme song could have added a pinch more spice to this wonderful game. There are sound effects like exploding bombs, descending elevators and squeaky noises representing attacks that give this game a fun touch.

It was a delight to review this package. The save/load-game feature allowed for continued play at a leisurely pace. The manual provides enough information to get you started without spoiling the flavor of the game. For instance, the manual mentions spells that will be useful in your journey, but doesn't mention how to use them. Their intended uses are left for the adventurer to discover. The quality of the manual is another nice touch. The game requires a CoCo 3, a disk drive and an RGB or composite monitor. A joystick is optional. This is a good, clean game the whole family can enjoy. My feelings can be summed up with one word. More!

(Sundog Systems, P.O. Box 766, Manassas, VA 22111; 703-330-8989; $34.95 plus $2.50 S/H)

—Tony Olive

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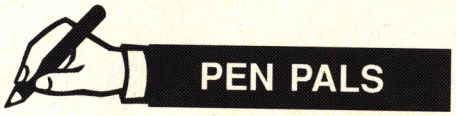
Intercom

An important link in the CoCo community is its ability to communicate with fellow users. If questions arise, a fresh source of information can be invaluable. We here at THE RAINBOW have decided to create "Intercom," an information exchange point for Pen Pals, CoCo Clubs and BBSs.

If you would like a Pen Pal or are running a CoCo Club or BBS, send us a letter including the information listed here to: The Rainbow Intercom, P.O. Box 385, Prospect, KY 40059.

Only those parties who have signed our non-piracy "agreement form" appear in listings of Intercom. Also, please notify us if you want to add or delete any names on this list.



PEN PALS

✍ I am 12 years old and have a CoCo 3, a CM-8 monitor, an FD-502 disk drive, and a DMP-132 printer. I'm looking for pen pals from all over the world. I would especially like letters from Australia.

Max Fischer
629 So. 8th St.
Vincennes, IN 47591

✍ I have a 128K CoCo 3, an FD-501 drive, a CCR-81 cassette recorder, a 1200-baud modem, a DMP-106 printer, and a Multi-Pak Interface. I will answer all letters.

Rich Butler
702 Northcass, Box 304
Mt. Ayr, IA 90894

✍ I have a CoCo 3 with two disk drives and a graphics printer. I'm 12 years old and love the CoCo. I would enjoy communicating with pen pals from anywhere in the world. I love games.

Sergio Abrahao
Rua Fradique Coutinho, 623 ap 63-B
Cep-05416 Sao Paulo SP
Brasil

✍ I'm 15 and would like some pen pals. My system is a 64K CoCo, a disk drive and a DMP-105 printer. I have just started to get into computing, so please help.

Terry Phillips
406 Spring Rd.
Jamestown, NC 27282

✍ I want to start a club for small business owners like myself who are now using the CoCo for mailing lists, inventory, accounting etc. Anyone out there interested in an exchange of uses and ideas please contact me by mail. Thanks.

J.K. Sinrod
16 Scranton Ave.
Lynbrook, NY 11563

✍ I'm 14 years old and would like pen pals from anywhere, but especially any residing in my area. I own a CoCo 3, a CCR-81 and an FD-502 disk drive. I love Adventure gaming. I'll try to respond to all letters.

James McCarthy
RD 4, Box 520
DuBois, PA 15801

✍ I have a 512K CoCo 3, an FD-502 and a Teac 3.5 inch disk drive, a DMP-105 and a DCM-106. I'm 31 years young and I enjoy communicating. I will answer all letters, but I prefer computer-related matters. I am also interested in forming a BBS.

Art Foley
600 S. 27th St.. #914
Omaha, NE 68105

✍ I'm 18 and looking for male or female writers around my age. I have a CoCo 3, a BBS, a CCR-81, two FD-502 drives, a DMP-106, and I know a lot about computers. My interests are science fiction, electronics, computers, computer art and robotics. I'll answer all letters and messages.

Brian O'Conner
36 Waverly Place
Melrose, MA 02176

✍ I have a 512K CoCo 3, an FD-502 dual drive, a DMP-130 printer, a modem and a CM-8 monitor. I'm 32 years old and enjoy arcade and Adventure games, as well, I like CoCo 3 artwork. Other interests include watching and collecting Star Trek memorabilia! I'm looking forward to meeting new CoCo pen pals from all over the world. I will reply to every letter I receive.

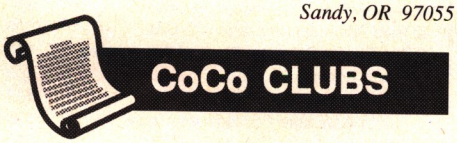
Michael Terry
P.O. Box 1966
Cornwall, ON K6H 6N7
Canada

✍ I'm 16 years old and have a CoCo 3, an FD-502 disk drive and an Epson printer. My main interest is in getting information about the OS-9 operating system and telecommunications. I'd especially like to receive letters from Puerto Rico.

Luis E. Tanon Garcia
P.O. Box 475
Naranjito, PR 00719

✍ I'm 36 years old and have a 512K CoCo 3, Extended ADOS3, a CM-8, an MPI, a digitizer and assorted drives, modems and printers. I love graphics and digitizing photos, as well as BBSing. Besides the CoCo, I love hard rock music, photography and videography. Seeking pen pals, ages 13 to 80, male and female, with similar interests. I will answer all legitimate letters.

Steve Ricketts
P.O. Box 828
Sandy, OR 97055



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☎ Colorado Springs Color Computer Club, Bud Ward, 1118 Claiborne Road, Colorado Springs, 80906-5513, (719) 392-8268

FLORIDA
☎ Cross-Country Color Computer Club, Tom Tittle, 860 Gardenia Drive, Royal Palm Beach, 33411, (407) 798-3726

GEORGIA
☎ Macon-Warner Robins Color Computer Users Group, Francis G. Swygert, 904 2nd Avenue, Robins AFB, 31098, (912) 328-7859

ILLINIOS
☎ CoCo Users Group, c/o Greg Adams, 224 Park Drive, Sterling, 61081-3033, (815) 626-4962

KANSAS
☎ The Kansas City Color Computer Users Group, Gay Crawford, 1601 Kiowa Drive, Olathe, 66062, (913) 764-9413

KENTUCKY
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MICHIGAN
☎ Color Computer Owners Group, Bernard A. Patton, 388 Emmons Blvd., Wyandotte, 48192, (313) 283-2474

MISSISSIPPI
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MISSOURI
☎ CoCoNuts User Group, Clyde Lloyd, 2116 N. Columbia, Springfield, 65803, (417) 866-8738

NORTH CAROLINA
☎ Raleigh CoCo Club, P.O. Box 10632, Raleigh, 27605, (919) 878-3865
☎ The Tandy Color Computer Users of Charlotte, Eric Stringer, 1022 Noles Dr., Mt. Holly, 28120

OHIO
☎ Dayton Area Color Computer Users Group, John Teague, 308 Orangewood Drive, Kettering, 45429, (513) 434-9168
☎ The Greater Toledo Color Computer Club, Bill Espen, 1319 North St., Bowling Green, 43402, (419) 471-9444

PENNSYLVANIA
☎ Johnstown Area Color Computer Users Group, Albert Baldish, 111 C St. Apt #1, Johnstown, 15906, (814)535-1497

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☎ Empire Area Color Computer Users Group of South Dakota, Carl Holt, P.O. Box 395, Brandon, 57005, (605) 582-3862

AUSTRALIA
☎ Australian National OS-9 Users Group, Gordon Bentzen, C/- 8 Odin Street, Sunnybank, Queensland, 4109, (07) 345-5141
☎ Brisbane Southwest Colour Computer Users Group,

Bob Devries, 21 Virgo St., Inala, Queensland, 4077, (61)-7-3727816

CANADA

☎ Club Ordinateur Metro Inc., William Manning, 3020 D'Angouleme, Tracy, Quebec, J3R 3B3, (514) 742-3692

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☎ Le Club D'Ordinateur Couleur du Quebec Inc., 7110 8 e. Ave, St-Michel, Montreal, Quebec, H2A 3C4, (514) 729-8467

☎ Moncton-Dieppe-Riverview CoCo Club, Philippe Lantin, 77 Ninth St., Moncton, New Brunswick, E1E 3E5, (506) 382-7706

GERMANY

☎ OS-9 Users Group in Europe, Burghard Kinzel, Leipziger Ring 22A, D-5042 ERFTSTADT

PUERTO RICO

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[4]Pat BBS is up 5 p.m. to 9 p.m. weekdays and 10 a.m. to 10 p.m. weekends. This new BBS is counting on you for uploads.

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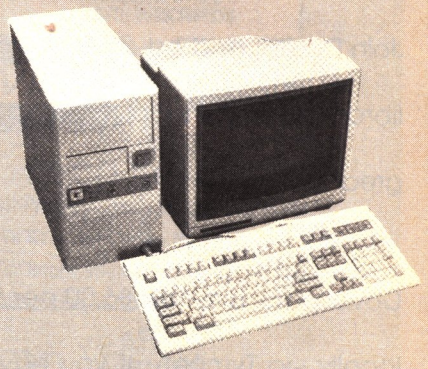

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What is *significantly* important is that you can use a large amount of your present software with the **Tomcat**! Right. You don't have a major expenditure for new software.

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Your new **Tomcat** is compatible with Radio Shack DOS. It will run most of the programs you use every day. As an OS-9 machine as well, it will also work with all OS-9 software you either own now or plan to buy in the future. All of your CoCo cartridges like those from Disto and Burke & Burke except for ROMpaks will work with your new **Tomcat** as well.

But there are even greater advantages to the **Tomcat** system -- and an affordable path to upgrade your CoCo without losing *any* of the value you have in your CoCo system today.

Tomcat is also compatible with the FHL K-Bus, which means you can interface it to a 68000 CPU, or even the 68030. While that sounds very technical, the truth is it is as easy as plugging in a couple of boards. And once it is done, the **Tomcat** becomes just like two computers in one -- your own, reliable (but faster and more powerful) CoCo, and a 68000-based computer which will run OS-9 programs 30 times faster than before.

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Most important to you, this is upgrading without throwing anything away! Much of your present software will work. Many of your cartridges, disk drives, printers will just connect into place. New horizons open with new software and new boards which will make your own CoCo continue to be your cost-effective, friendly helper and companion as computing moves into the 90's.

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Take it at your own pace -- as your time, needs and pocketbook permit. If you currently own a CoCo 3 and use it in either the Radio Shack DOS or OS-9 Level II mode, **Tomcat** will operate your software faster and better. It will also give you powerful new features and performance at a modest cost.

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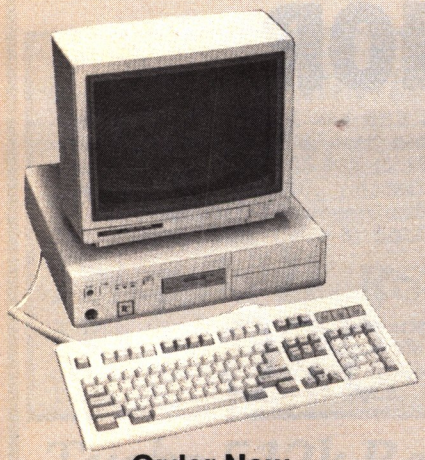

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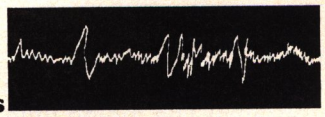

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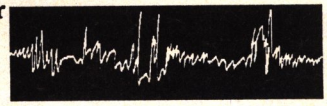

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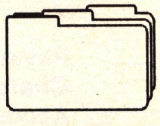

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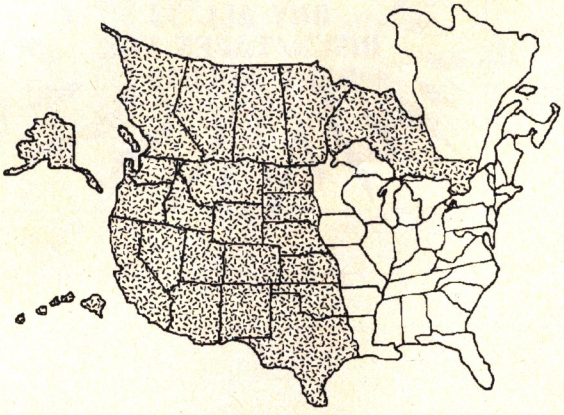

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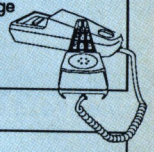

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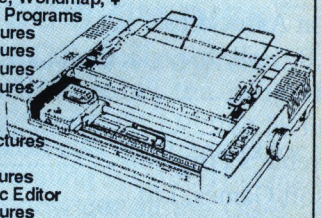
GR13 - Macpaint Graphic Editor
GR14 - 5 Macintosh Pictures

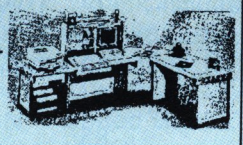


** *See Our Ad Containing 250 Graphic Pictures Elsewhere In This Magazine*

HOME MANAGEMENT 1-4

• 12 Programs Each Disk/Tape •

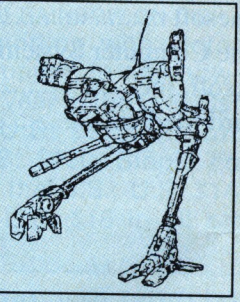
H1 - Checkbook, Loan, Word Processor, +
H2 - Cash Journal, Invest, Maillist, +
H3 - Life, Database, Stocks, +
H4 - Spelling Fix, Spelling Checker, +

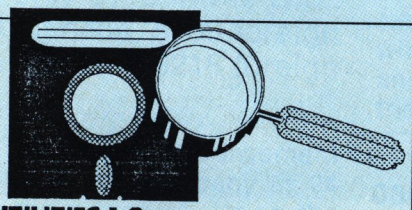


GAMES 1-11

• Each Disk/Tape Contains 12 Programs •

GA1 - 3D Tic Tac, Missile, Poker, Tycoon, +
GA2 - Amazing, Balloons, Motor Jump, Slots, +
GA3 - Battleship, Golf, Lander, Zero G, +
GA4 - ABM, LunarWorld, Protect, Subchase, +
GA5 - Blackjack, Lazer, Tipan, Utopia, +
GA6 - Kings, Maze, Shuffle, Tempest, +
GA7 - Chess, City, Life, StarTrek, +
GA8 - Chute, Germ, Hurkle, Lunar, +
GA9 - Civil War, Go-Fish, Stock, UFO Maze, +
GA10 - Cave, HiLow, Scramble, Word Hunt, +
GA11 - Biorythms, Craps 3, Gunner, Martians, +





UTILITIES 1-8

• 12 Programs Each, 1-4 Require Disk •

U1 - Backup 35, Basicmap, Timer, Tape-to-Disk, +
U2 - Customize, DiskTest, MasterDisk, Offset, +
U3 - View 64, DiskAid, Disk Library, Atari, +
U4 - AutoBoot, MacPicture, StateLog, UniBack, +
U5 - Disassembler, Graph, PaintPot, Squeeze, +
U6 - Clock, Llist 32, , MiniDos, Pixcomp, +
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M2	GR2	E2	U2	GA2
M3	GR3	E3	U3	GA3
M4	GR4	E4	U4	GA4
M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

PLEASE CIRCLE

TAPE DISK

Please turn to pages 55 & 88 for our Subscription Software!

Make all your Holiday Greeting Cards this season on your CoCo!

Don't wait until the last minute! Order NOW and be ready.

With Zebra's CoCo Graphics Designer Plus ($29.95) and supplementary Picture Disk #4 ($14.95) you can turn out beautiful personalized cards for all the Holidays.

The CoCo Graphics Designer Plus (CGDP), works on both the CoCo 2 and 3. It automatically prints out greeting cards as two panels on standard 8 1/2" x 11" printer paper. One panel is printed right-side-up in the lower right, and the other panel is printed upside down in the upper left ready for you to simply fold it. The CGDP allows pictures, and text in up to 4 sizes and 16 fonts on both the outside and inside of your card. The program features beautiful hi-resolution borders and complete on-screen previews. The CGDP comes with 16 borders, 5 fonts, and 32 pictures. Its easy-to-use point and click graphical interface, features windows, scroll bars, radio buttons, and joystick or mouse control. And on top of all this it makes great signs and banners too. *Requires 64K CoCo 2 or 3, Disk Drive, Mouse or Joystick & Compatible Printer.*

We now offer 6 different supplementary disks of picture collections. For making greeting cards get #4, the Holiday Picture Disk. It contains 120 pictures for Christmas, Thanksgiving, Jewish Holidays, New Years, July 4th, Easter, Halloween, Parades, Saint Patrick's, Saint Valentines Day and more.

THE Print Shop Paper Pack

Brighten up your **Greeting Cards Signs & Banners!**

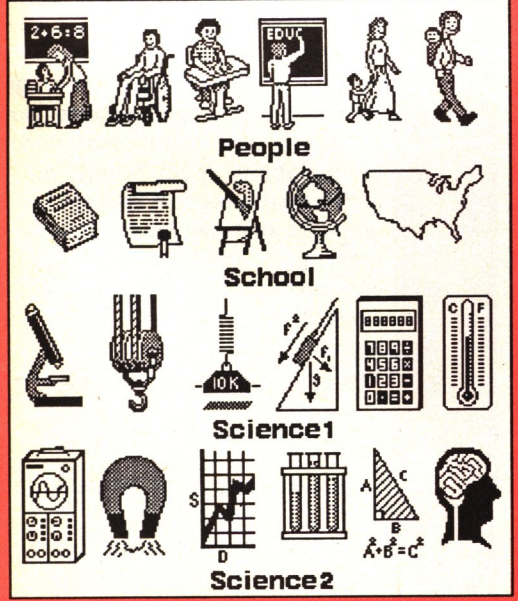
120 Sheets of Pinfeed Paper in assorted colors with 42 Matching Envelopes.

$19.95

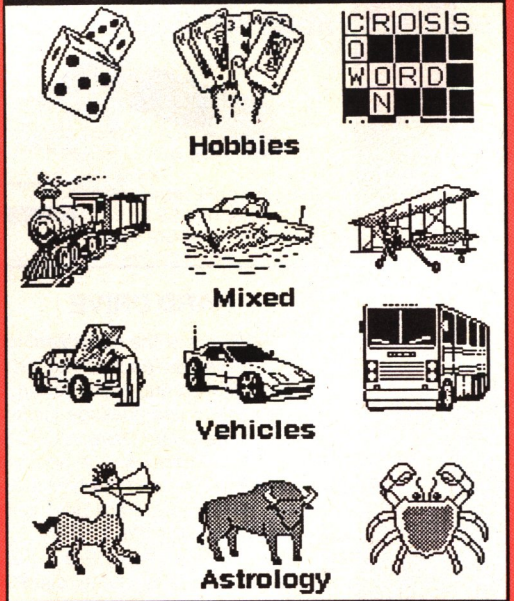
Print Shop is a trademark of Broderbund Software

Introducing 3 NEW Picture Disks

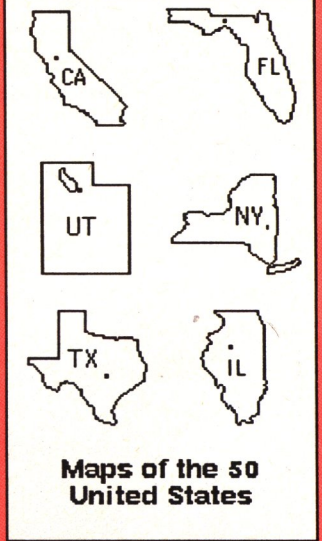
Samples From **Picture Disk #1**



Samples From **Picture Disk #5**



Samples From **Picture Disk #6**



GREAT COCO CLIP-ART! Picture disks supplement the pictures that come with the CGDP. Disks 1, 2, 3, and 4 have 120 pictures each, arranged by subject. Disk 5 has 60 double-width pictures and disk 6 has 50 double-width maps of the U.S. States. Besides being compatible with Zebra's CGDP and Label Designer, each disk contains a utility to easily transform our pictures into CoCo Max Pages, CoCo Max II Clip book pages, CoCo Max II scrap books, and Max-10 clip art files.

Zebra's Picture disks 1, 2, 3, 4, 5, and 6 are each priced at	$14.95
Border Disk (174 borders for CoCo Grapics Designer Plus)	$14.95
Font Disk A, B (10 fonts per disk) are each priced at	$14.95
CoCo Graphics Designer Plus (cards, banners, & signs)	$29.95
Print Shop Papar Pack	$19.95
Label Designer (makes labels with graphics & text)	$34.95

Ordering Instructions: All orders add $3.00 Shipping & Handling. UPS COD add $3.00. VISA/MC Accepted. PA residents add sales tax.

Zebra Systems, Inc., 121 S. Burrowes Street, State College, PA 16801 (814) 237-2652

KEYBOARD

- 101 Keys with tactile touch
- Coiled cable with RF filter
- can be used with CoCo, Tandy or IBM and auto senses XT or AT

KB-1	Keyboard	$98.00
KB-A	CoCo Adaptor	$89.50
KB-1A	Keyboard & Adapt.	$149.00

MAGNAVOX 7622 AMBER OR 7652 GREEN

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- Built in Speaker

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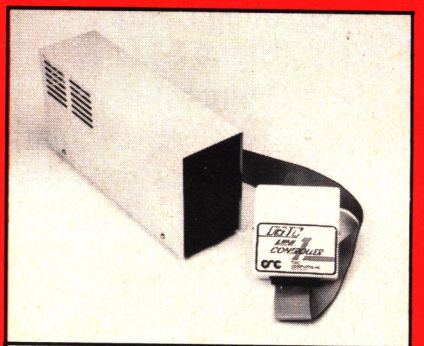
DC-7	Mini Controller	$ 75.00
DC-3	Super Controller	$ 98.00
DC-6	No Halt Controller	$129.00
MBA-1	3 in 1 Board	$ 69.45
MEB	Mini Expansion Bus	$ 30.00
RS232	RS-232 Port	$ 49.95
DC-3C	Clock and Parallel Port	$ 40.00

PRINTERS

STARNX-1000R	COLOR	$249.00
STARNX-1000II		$189.00
VA-1	Video Converter for CoCo 1&2	$29.45
HR-2	Dual Hi-res adapter	$39.45



DRIVE 0 PLUS

- Double sided 360K MPI 52
- Disto DC-7 controller and cable **$178.45**
- Double Drive 0+ **$289.00**
  Drive 0 + Drive 1 (TEAC)

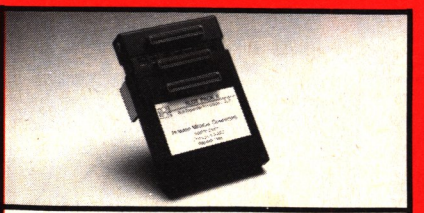
MEMORY

• 512K Bare Board	$40
• Populated 512K & Software	$89
• 1 MEG Bare Board	$160*
• Populated 1 MEG	$200*

*requires 512K upgrade

FLOPPY DRIVES

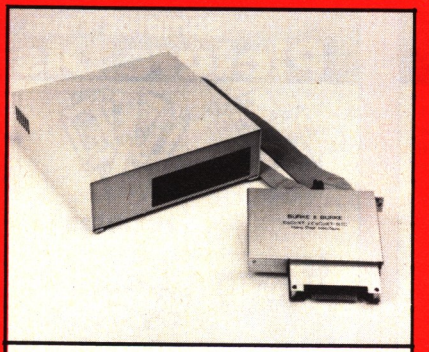
52	MPI 5¼ Full Height 40 track Double Sided 360K	$75.00
55B	TEAC 5¼ Half Height 40 track Double Sided 360K	$98
235	TEAC 3½ Half Height 80 track Double Sided 720K	$89
FR-35	Frame Fits 3½ into 5¼ space	$12
502-C	Power Cable for 502	$12



SLOT-PACK III by Chris Hawks

- replacement for multipack
- 3 slots, 2 switchable, new hard switch
- X slot for RS-232 for modem (specify)
- middle slot can take disk controller or ROM cartridge
- 12 Volt adaptor required so power is not drawn from CoCo

MP III	slot pack III	$89.45
AC-12	12volt adaptor	$14.95



HARD DRIVE

20,000,000 Bytes or the equivalent to 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. This complete easy to use package includes a Seagate 20 Meg Hard Drive, a DTC 5150 Controller and interface, * a heavy duty case, power supply and fan and a 1 year warranty. This 20 Meg Hard Drive will also work with Tandy and IBM clones.

RSB Access Basic thru OS-9 $39.45
FILE REPACK Un-Fragments disc $29.45

See Rainbow Reviews 8/89

HD-1	**10 Meg****	**$349**
HD-2	**20 Meg**	**$499**
HD-3	**30 Meg**	**$549**
HD-4	**40 Meg**	**$598**
HD-8	**80 Meg**	**$1,090**

*Burke & Burke **reconditioned

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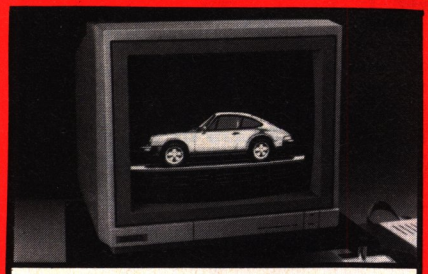
Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give your your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.



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CoCo Max III

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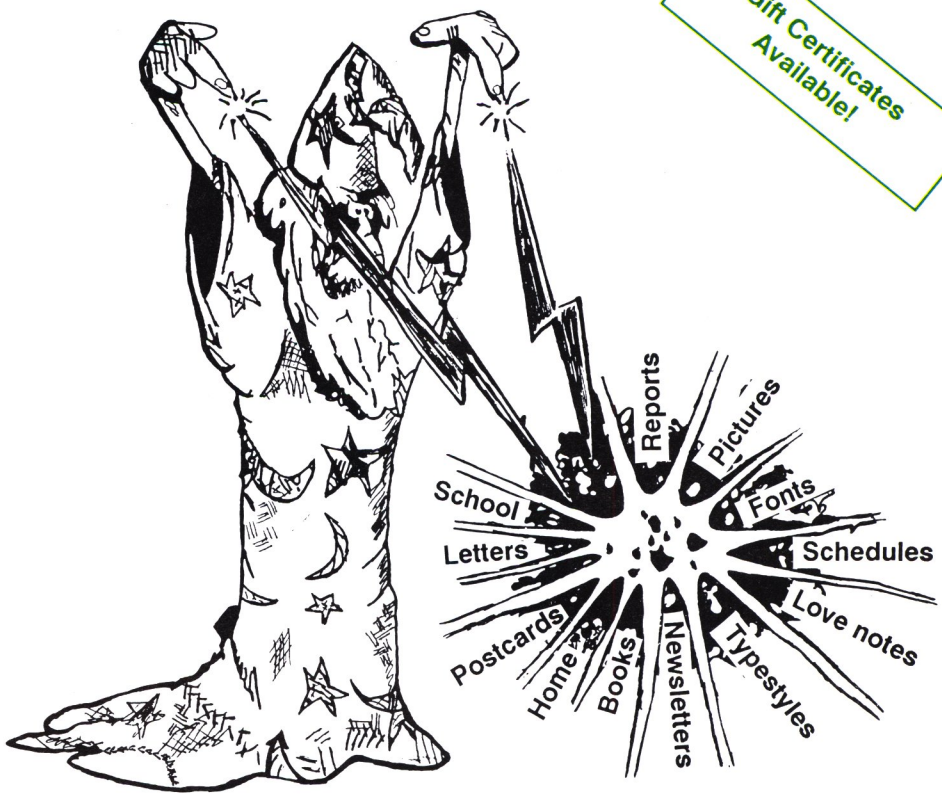
Save $100

BOTH

CoCo Max III and **Max-10** for

~~$149.90~~ now only: $49.95

Gift Certificates Available!



Christmas Bonus: THE WORKS for an amazing $79.95

The Works is: CoCo Max III + Max-10 plus ALL the additional fonts at a super low price

About Max-10

What the CoCo Community needs is a word processor that's rock solid, blindingly fast, feels like a Macintosh, makes all the others look boring, and does not cost $80.
Max-10 is just that and more. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview (with graphics).
We swear that Max-10 will add excitement to your word processing, and that's no small task!
PRINTERS SUPPORTED: EPSON FX,MX,RX,LX AND COMPATIBLES; DMP 105,106,130; CGP220 (B&W); OKI 182,92,192; STAR NX-10, NX-1000.

Max-10 Add-ons

- **Max-10 Fonts**. 36 super fonts on 2 disks. Send for list. Order #C-23 ....~~$29.95~~ **$14.95**
NOTE: Max-10 and CoCo Max Fonts aren't interchangable.
- **Spell Checker** 35,000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10. Order #C-24.....~~$29.95~~ **$14.95**

System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack Hi Resolution joystick interface; a video or RGB monitor or a TV.

About CoCo Max III

Whether you doodle for fun or design graphics for a living, **CoCo Max** will amaze you. It's simply that good!
Its major features include: Huge picture area (2 full hi-res 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation**. Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull-down menus. **40 paint brush** shapes. Two color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.
PRINTERS SUPPORTED: EPSON RX,FX,MX,LX AND COMPATIBLES; STAR/GEMINI NX-10,NX-1000; DMP100,105,106,110,120,130,200; OKI 82A,182,192; CGP-220(B&W)
Color Drivers available. See next column.

CoCo Max III Add-ons

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Or two sets of two disks each .....~~$29.95~~ **$14.95**
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- **Color Printer** drivers NX-1000 Rainbow, CGP-220 and Okimate 20. Bring your pictures to life with the magic of color. For CoCo Max III only .....~~$29.95~~ **$14.95**

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